AMERICAN MACHINIST

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Machine for Testing Materials.

ACCORDING TO THE SYSTEM OF CHAUVIN AND MARIN-DARBEL.

The cut on this page shows a machine to test by means of tension, deflection, and compression, metals, boulders, stones, etc., weighing 30, 60, and 100 tons. We take both cut and description from *Les Annales des Travaux Publics*, of Paris.

These machines, for testing all kinds of materials, have for their system or base the atmospheric pressure acting upon a movable stand, which is suspended under a permanent fixed one above it. The compression of air between the two stands is obtained by the aid of water, which communicates with a double column of mercury.

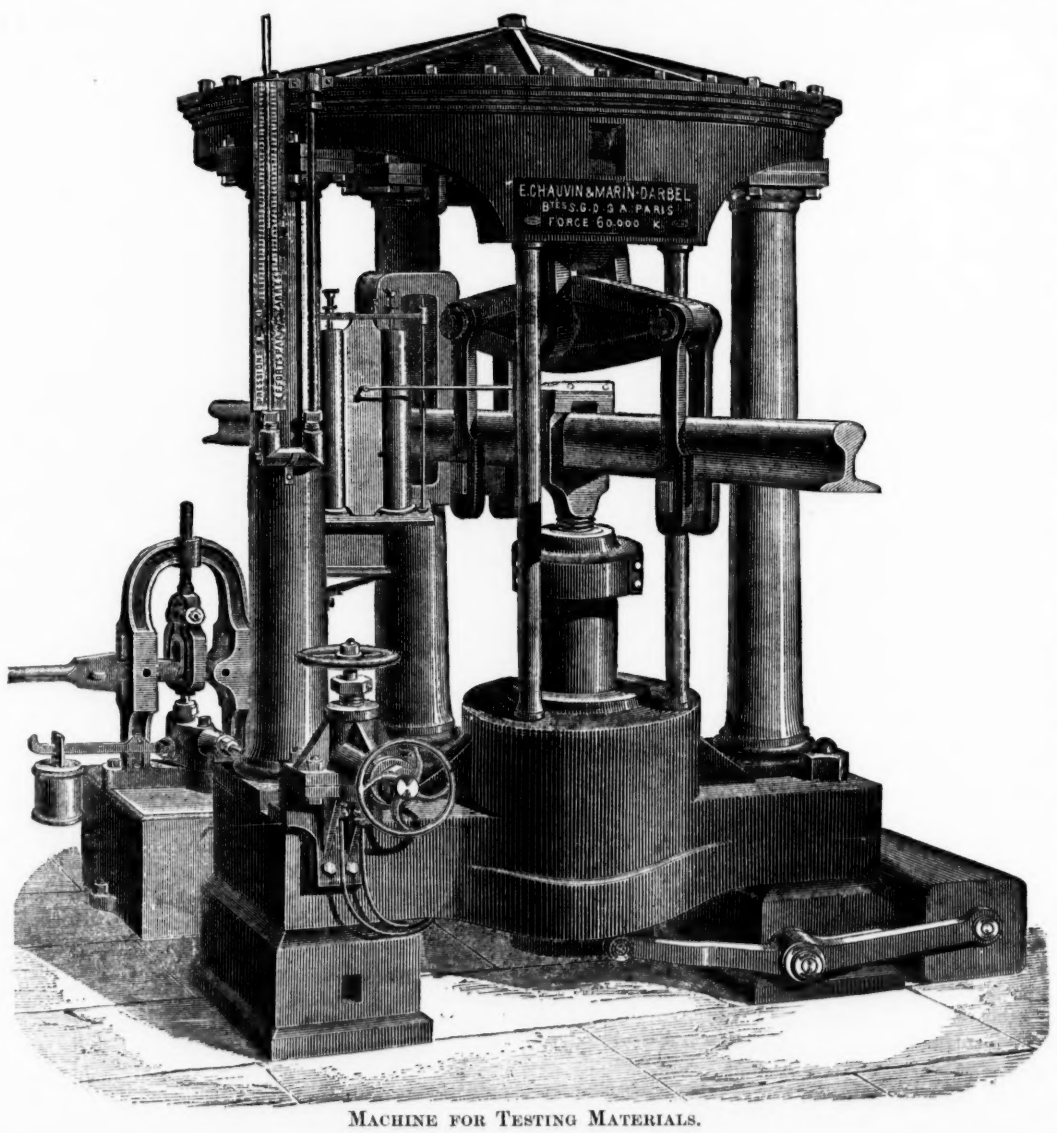
The screw holding the lower brace for the piece to be tested is made to descend, either by the action of hydraulic pressure, as in the case of strong machines, or by a wheel moved by hand with smaller machines, in such a way that the upper attachment of the piece to be tested acts directly, or by means of a lever, in a more positive way, upon the lower movable stand, which draws the mercury from the column. A graduated scale gives the corresponding power of the lowering level of the mercury during the operation. The lowering of the movable stand for the maximum strength of the apparatus is arranged with such a nicety that a reading of the $\frac{1}{100}$ of a millimeter may be taken for the maximum power.

This result is very important, in this, that the stationary attachment of the parts submitted to test, being in all probability immovable; and the expansion, flexibility, and grinding, are determined with precision by the displacement of the movable attachment, showing at the same time the pressure with great precision.

The graduation of the scale is obtained by calculation, confirmed by experience, and always easy to be made, by means of the standard weight, which can be suspended by the movable stand. It is not necessary to remove either the screw or the lever, for testing each specimen. It is sufficient to adjust the attachments appropriately to the materials to be tested, the same as for a standard scale. Before an operation, it is necessary to adjust the scale according to the weight of the specimen to be tested. The scale of graduation is made to vary, so that a point, attached by an arm to the specimen, corresponds to the level of the mercury in such a way as to note all the effects produced during the trial.

The extensions, deflections and compressions are directly obtained by means of a compass on the parts to be tested, and by observing the displacement of the two points marked in advance, or either by adopting a double microscopic instrument, which allows the observation of the extensions, the deflections and compressions of $\frac{1}{20}$ of a millimeter. In consequence, this machine presents to the operator a perfect and reliable guarantee of precision by its extreme sensibility, and the advantage of its small capacity, due to its vertical position and the good management of its accessories. The whole apparatus is subdivided as follows:

I.—A machine of 60 tons power is able to test—



MACHINE FOR TESTING MATERIALS.

1. By tension—bars of iron, steel, and bronze, of a diameter of 16 mm. and 20 to 30 cm. in length.

2. By compression—pieces of steel, cast iron, and materials for construction.

3. By deflection—bars of six meters in length, on two supports, divided at a distance of one meter.

In these different tests the attachments, the same as the suspension for the deflection and compression, are studied with the greatest care, so as to give the force transmitted and the effects produced with all the precision possible.

For example: It will give the rupture of steel rails under a pressure of 45 tons, the supports being 1 meter between centers. The average point has been 25 millimeters. As the pressure is produced by hydraulic power, the deformation of the specimens is formed gradually, and so well, that it is very interesting to observe the specimens by the form produced; also, the molecular changes in the homogeneity of the metal.

II. A machine of 30 tons will test specimens submitted to tensile, deflective or compressive strains.

This kind of machine applies to the testing of boulders, sheet iron, bars of 16 mm., tried by tension and deflection, the supports being at a distance of 80 cm., and lastly by compression.

This machine is also as complete as the preceding one, its strength being limited only at 30,000 kilos.

III. Machine for testing iron wire, and especially telegraph wire.

In this machine the pressure is produced directly by means of a screw operated by hand, and can go as far as 2,000 kilos.

The attachments are very particularly studied, so as to very easily fix the metallic thread, and, above all, so as not to weaken it to the point of attachment, obtaining thereby the essential result, that the unprepared thread can break at any point outside of the attachments.

IV. Machine to test paper, silk thread, &c.

This machine is constructed for power from 30 to 100 kilos.

The principle in these machines is the same, and the strain is obtained directly; as in the preceding cases, by means of a wheel worked by hand.

Where and How to Build Machine Shops.

BY A. H. EMERY, C. E.

It is not my purpose in this article to exhaust the subject in hand, but simply to throw out a few hints bearing thereon.

First as to location: This question is of much more importance than is usually recognized. It often happens that some small shop, or shops control the location of large ones, simply because some one has put them there, who would have had no thought of assembling there the larger industry, which so often follows in the home of the smaller. And the small shop, with ample room for its first use, becomes small and cramped, and additions are repeatedly made, until a large number of buildings are assembled in form, construction and arrangement unsuited to their use in many particulars.

It rarely happens in such constructions that proper care is observed in regard to light and ventilation; and, often, many rooms, well lighted and ventilated, become deficient in this respect, because of additional structures erected around them. Where circumstances will permit, the works should be placed in a part of the country, that will, by reason of its soil, air, climate, etc., help to make it a desirable place for the workman to live in, year after year—not merely a place for him to earn daily bread in, so long as he may be obliged to, and no longer; but where he and his family may live and grow up useful, happy citizens. The mechanic should not be simply a machine, to do what is ordered; but to be most valuable to himself, his family, his employer, and to society, he must be a living, active, thinking, and happy man.

Let the location by all means, if possible, be in a place designed by nature and man to help bring this about. It is seldom that all considerations together of this kind are allowed as much weight as even the money point alone would entitle it to, and, in this respect, money often decides against its own best interest, in not looking sufficiently after the present and permanent happiness of its servants.

Now a dead machine, without thought, sight, breath, or sensation of any kind, may work as well and as rapidly in a damp, dark, cold, cheerless room, full of disagreeable odors and miasma, as elsewhere; but not so with the living mechanic, who, to be of most use, must feel an interest in the place where he lives, especially in his own home, which is best brought about by having a home with garden, yard, etc., which he tries to improve with himself and family, and which he does not wish to leave, rendering him therefore doubly anxious to make himself useful to his employer, not only that he may stay there, but that he may earn larger wages. He thus becomes not only interested

in his own success, but indirectly in that of his employer, that there may be work for him continually, and at fair wages.

We should, therefore, as far as practicable, select for the location, one that is dry, healthy, and cleanly, and one where the men may make homes for themselves, if they will. This last will often cause selections of location in which the item of freights may be largely against the place selected.

The facility of obtaining suitable food for the men and their families, especially meats, fruits, vegetables and dairy products should be well considered, the wages to be paid, and the value of the men to be employed being of much more importance usually than freights.

Having obtained by selection a suitable place for building, thought should be taken, not only of the present needs of the industry in the way of buildings, but also of their needs in this line for years to come, and as far as practicable, to begin at the outset, buildings which may eventually be a part of a plan and much larger than at first needed, or constructed, and all arranged with reference to the best use of the whole. Secure for each building a *large quantity of light.* Not one mechanic in a thousand fully realizes the full value of light. It affects largely and directly his health as well as the quantity and quality of the work performed by him.

Look at the plants and flowers, and see how soon and in what way they show the effects of more or less light. If it were simply for the effect on the life, health and spirits of the man, the light would be of vast importance, more indeed than any one can tell; so much so, that if this article causes but a single window to be added to but one insufficiently-lighted room, used as a work room for a human being, I shall be well paid for my pains in writing it. Not only is this question of light one that bears directly and largely on the health, happiness, spirits and value of the workman in the near future, but it affects immediately the quality and quantity of the work done by him, often to an extent which will by many be thought to be incredible.

Time and again have I had work done that cost me $500 or $1,000, which would have cost but *one-half* this sum had the room in which it was done been *well lighted* instead of very poorly lighted, and it was not done in rooms ordinarily considered dark either. No basement room, partly under ground, is suitable for this use. These are too damp and too dark. Make the stories high between joints, and let all ceilings and walls be absolutely white, not only when made, but have them kept so as far as possible.

There should be suitable places for the shop's tools and for each man's tools, places for partly constructed work in its different stages, and places suitable for storing constructed parts, as well as places suitable for the construction of the work itself, together with places for its erection, and, lastly, for its storage until time of shipment.

Let every man be cleanly in his personal appearance, cleanly in his work, and put each room in order, and have it so constructed that it may be kept cleanly and in order at all times. This order and cleanliness will tend to improve both the quantity and quality of work turned out, and the works should be constructed so that this may be observed and enforced. There should be no dark, damp or unventilated rooms on the premises.

When buildings and other property burn, the property destroyed represents usually but part of the loss. How often we see half the population of a village made idle by the burning of a single manufactory. Such a misfortune may often cause great loss and hardship to many families, though they themselves had nothing burned. Members of these families are thrown out of employment, and must leave their homes to seek work elsewhere. The homes they thus leave often become of greatly reduced value in consequence of the fire, which did not touch them.

All buildings for permanent use as manufactories should, as far as practicable, be made fire-proof. Mechanics and other laborers are, in this country alone, obliged to build and manufacture annually about one hundred million dollars' worth of buildings and other manufactures to supply the waste caused by fire alone. All this waste may be wholly avoided, so far as it relates to that of the shops themselves and most of their contents.

In regard to economy of floor space, it will be remembered that one roof will cover but one floor in a one-story building, while it will equally well cover two, three, four or five floors in buildings of as many stories. Often several floors in one building are more convenient for use, when assembled in that way, than when spread out on the ground in several buildings. No small attic rooms or shallow spaces over another room should separate it from the roof, as this makes too good a place for fire to run in. Allow no place to be built anywhere that cannot be reached at once by water from the hose, if it be made of, or occupied by, materials that will burn.

Let the upper rooms be high and reach clear to the roof, thus making all the space available and within the reach of the water hose. In regard to the money that may properly be spent to make buildings fire-proof, it should be borne in mind that, if the insurance fully pays for the property destroyed by the fire, it does not pay for the loss and interruption of business, nor the losses of the laborers who are thrown out of employment, these losses often being more than that of the property burned.

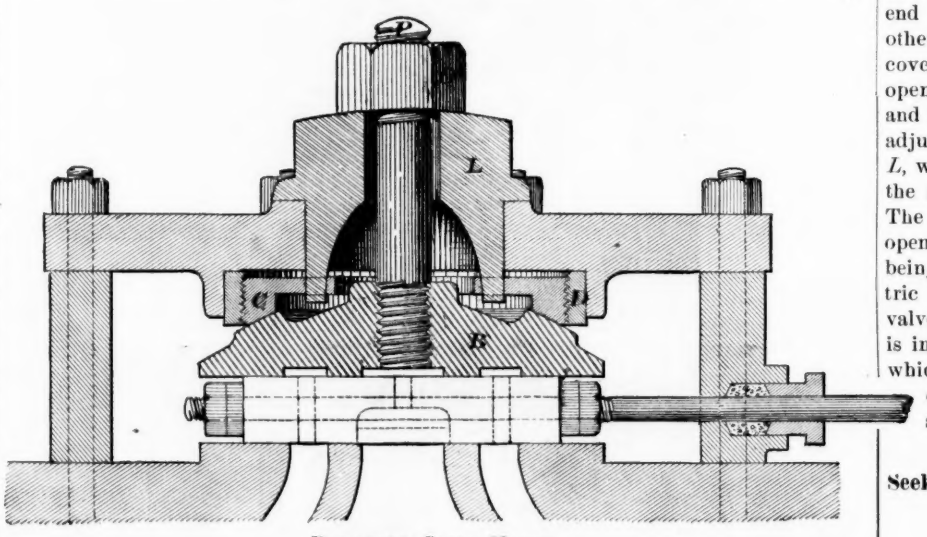
Besides, the money paid by the insurance companies, not only had first to be paid *to* the insurance companies, but with it are additional sums to cover the costs, other than losses, and the profits of the insurance business. Make, therefore, as little of your plant burnable as may be, and insure as little as may be practicable, thus avoiding the fire losses to yourself and country.

In machine shops designed for ordinary tools, such as planers, lathes, &c., not requiring heavy masonry, lay the floors directly on the ground. This, if soft, should be well rammed, and then covered with a thick coat of gravel and concrete. If not soft, a thinner coating of the gravel and concrete will answer, which in all cases should be of such depth and strength that it will not crack under the loads to be placed on the floor which is laid thereon. The concrete should be covered with an inch or more of coarse sand and pitch, laid hot, firmly and smoothly, which will entirely prevent the rotting of the underside of the floor. This floor may well be of yellow pine, 1″ to 1¼″ thick, nailed to joists 3″ x 3,″ laid flush in the concrete and pitch covering, and will last until worn thin, when it may be easily replaced. Previous patching is more easily done if the boards are not matched, which is unnecessary when thus laid.

All floors, above the first, should, as far as economy will permit, be made of brick arches, either of bricks solid or hollow, laid with strong cement between iron beams which should support them. These arches are best covered with cement to a level even with or above the top of the iron floor beams. In this cement should be placed small strips, say 3″ x 3,″ laid flush with its top, to which the floor should be nailed. The flooring should also lie directly on the cement, the upper face of the cement being made smooth and level for this purpose. This floor should be laid at right angles to the iron beams, and may be one inch thick and crossed diagonally with another which should be 1″ to 1¼″ thick. This upper floor stiffens the building very much, and is easily repaired and replaced from time to time, as it becomes worn. Tools resting on such floors stand very steadily, and these floors will never burn, as fire will not run in them, but burns *very* slowly even if left alone, so the watchman without help can care for all fires which occur in them.

The roof should be nearly flat, and is very well and cheaply made of spruce plank, 2″ thick, planed and matched, and laid on beams five or six feet apart. This not only makes a good roof support, but a good ceiling, and should be covered with, say, five or six thicknesses of tarred paper, laid with hot pitch, and coated with hot pitch covered with clean, *coarse* sand and gravel, while both are hot. A very small outlay in careful watching and repairs will keep this roof good many years, if well made at first; and it is at all times readily reached by water from the hose inside, so that such floors underneath such a roof need seldom be destroyed by fire, except from external fires, or from large fires arising from things on the floor underneath. A heavier, and absolutely fire proof roof, which need not be very expensive, is well made of light iron beams, and brick arches, laid in, and covered with water proof cement; this, in turn, being well covered with pitch, and a coating of hot pitch, mixed with lime and sand, covered with gravel. This roof will not burn; will not leak, if well made; costs exceedingly little for repairs, and protects absolutely from fires above it.

All the rooms in which gas is used should have a little ventilation at the top; open, when gas is used; and may need much top ventilation in hot weather. In cold weather, no ventilation at the top should be permitted, except that needed by reason of the burning gas. Of course, a constant supply of pure, warm, fresh air should be brought in. The cold air in the rooms, together with the carbonic acid, and other impurities from the breath, should be constantly removed by ventilation, provided at the *bottom of the rooms close to the floors.* This kind of ventilation, is, by far, the most economical, and most healthful; and when thus ventilated, there need be no hot or no cold air in the room; the coldest and most impure air being constantly removed. Steam heat should never be permitted without such ventilation.



BALANCED SLIDE VALVE.

A new method of preserving iron from rust has been discovered by a Mr. Ward, of London. The articles are coated with a silicate composition, and heated in a furnace until the composition is fused into the metal. The result is said to be very satisfactory.

Johnson's Balanced Slide Valve.

The requisites of a balance cover for relieving a slide valve from pressure are, that it shall be susceptible of immediate and unerring adjustment to the back of the valve, and of being held absolutely rigid and immoveable when adjusted. No slip-shod arrangement or contrivance of set screws, or of steam adjustment will do the business. The valve must move freely, must be steam-tight between the seat and cover, as between two unyielding walls, and when thus moving in perfect balance, and in such position that its weight is supported by the valve rod, will remain tight, theoretically, for ever. Practically it will not, and hence the necessity of means for convenient and ready adjustment. The improvement here presented by the engraving has been thoroughly tested, and is claimed to meet all the requirements, the construction being remarkably simple and well adapted for the purpose. The balance cover *B*, is pressed against the valve by the fine-threaded screw ring *C*, working in nut *D*, the nut being a thin brass ring fitting a recess in the steam chest cover, and held from turning therein. The edge of *C* is dished, or made concave, to fit the portion of a sphere upon *B*, against which it presses, forming a ball-and-socket joint therewith, to insure perfect seating of the faces when brought together. The block *L* is for turning the ring *C*, the outer end being formed for a wrench, while the other end extends through the steam chest cover, and has prongs, or projections, fitting openings in the flange of *C*. The bolt *P*, and nut *O*, are for securing the parts when adjusted, the nut being dished to fit against *L*, which is turned to a common center with the spherical portion of the balance cover. The adjustment is made with the throttle open and steam-pressure on, the engine being placed upon its center and the eccentric rod disconnected, so as to move the valve by hand to ascertain when the valve is in balance, the manner and operation of which will be clearly understood from the construction. Made by William Johnson, Lambertville, N. J.

Seeking Light on the Shafting Question.

BY F. F. HEMENWAY.

I am in search of light on the subject of line shafting. I have tried honestly, perhaps successfully, to brighten up from the discussion of couplings for shafts, and have taken some pains since then to examine several lines that were coupled in different ways. I have found flange couplings that gave trouble, and have found those that didn't give trouble; likewise clamp couplings, and so along through the list. Those that didn't give trouble had the generally indescribable appearance of a good job. Those that gave trouble had a generally troubled appearance.

I wonder how much of the universal complaint that has been lodged against every known device for coupling shafts ought to have been lodged against workmanship, and how much against the devices themselves. I don't know anything to speak of about a line shaft, and I want to find out a good many things before I put up mine. I want to know how much it will cost to run it; what kind of boxes to use; how long to make the journals; and what kind and how many hangers to have.

I put these questions categorically to "Joe,"—he gives me advice gratis—and Joe sat down on the first one by affirming, that if there is a man living who can answer it intelligibly, he keeps the knowledge to himself. Joe says he has seen 200 feet of 3-inch shafting running light, use up a good sized steam engine, and has seen a small engine driving 200 feet with considerable work on. He says there is less common sense to the linear foot put into a line shaft and its belongings, than in anything else belonging to a manufacturing plant. Joe says: "If a manufacturer turns, or planes, or weaves, or spins, he knows it costs less when his turning or weaving, or planing, or spinning

machines are properly set, than when set improperly, and he sets them properly and substantially. When he puts in a steam engine that is reasonably certain to get shoved out inside of ten years to make room for a high speed or a low speed," (Joe isn't a steam engine expert, or he would advise which one to put in the first time)." he pays a skilled mechanic to line, and squint, and level, and square it into a condition of perfection on the basis of a solid foundation that is not connected with any part of the building. He does this because it runs better, wears longer, and don't call for so much coal to keep it moving. He had the plan of that foundation incorporated with the general plan of his building, and it gets a first class mention in the specifications. When he puts up his line shaft, that will stay where he puts it as long as the building lasts, he don't hire an expert and he don't do it on any plan. One end of a hanger finds its way to a floor of timber that will settle four inches when the floor is loaded, and the other end, if possible, will be located on something that won't settle quite so much. One hanger will be ten feet from any ground support, and another will be alongside an iron column, resting on eight feet of masonry. No man in the establishment has any clear idea of where the line is to be located; and it will run in a generally irresponsible manner till it twists off. When it loosens a coupling in self-defence, the proprietor condemns his whole system of couplings, and sighs for some other. No man ever readjusts his line shaft until his engine gets discouraged." Joe isn't quite right here. I have seen the operation being performed within two weeks, and it was only 7½ inches out, at that. Also, he should qualify his statement in favor of a few manufacturing establishments, wherein provision was made for their shafting in the beginning, and wherein provision is made for its systematic care. He is right on general principles. Joe says, in reference to my other questions, that he has to find out a good deal about such things from the practice of others; but admits that in reference to this particular subject, he gets too much knowledge, and too little wisdom. Joe has found boxes, from cast iron to babbitt, which were from one and a-half to four diameters long; a good many of them in some instances, and a few in others.

After all, the best information I get from Joe is, that there isn't any law, written or unwritten, that gets right hold of a line shaft, and I am trying to reason it out. One length will meet present requirements. Wise men say friction is independent of the extent of surface in contact; upon which theory my 10-foot shaft would turn around as easily in a box the whole length of it, as it would after nine-tenths of the center had been cut away.

* * * * * * * *

I don't think I shall make the journal 10 feet long. Room for pulleys will have something to do with it, and if the 10 feet should in process of time expand to 300 feet, I don't believe I could get credit for an engine large enough to move it on such journals. If I put up my 10-foot shaft, 2 inches in diameter, and load it with 1,000 pounds, it will be deflected about one inch. If it is fitted with a rigid, close-fitting box at each end, and four diameters in length; these boxes will have to keep straight the portion of the shaft which they embrace, and they must do this work on the short end of a long lever. That shaft won't run easily till it grinds these long boxes to the condition of short ones, and it might be cheaper and more satisfactory to shorten them in some other way. Another box in the center of the shaft will obviate fifteen-sixteenths of the deflection, and reducing the length of the journals to two diameters, will give more effective bearing surface than the two long journals.

* * * * * * * *

Modern practice does not contemplate rigidly-fixed boxes for light shafts, and that ten-foot length will have the ball and socket device in the way of hangers. The general deflection will not trouble that device materially. The single length, with a hanger at each end, will be nearly perfect, and it will keep so. The boxes may be four diameters long without much grinding.

* * * * * * *

I want to make provision for my shaft to grow from either end. Next year I hope to couple ten feet to each end, and I can't see the same perfection in the ball and socket. The load on one length will call for a movement of the box in one direction, and the load on another length will call for a corresponding movement in another direction, and between the two tendencies there will be a halt, and some one must pay for grinding the long boxes to shorter ones. I don't think I shall use boxes four diameters long. The highest-toned kind of universal joint connection between the box and hanger won't remove all objections.

* * * * * * *

I am converted to shorter boxes, lighter hangers and more of them. I want the universal connection between box and hanger, not the arrangement that permits motion in two directions, but in all directions. I don't want it because it cures all the ills of a line shaft. I want it, because it helps matters.

If I find some one with a universal coupling, something a little better than perfect in its operation, that will allow one shaft to settle three inches, and its neighbor to settle two inches, I want it. If I can't get that, I am looking for an "instantaneous vertical adjuster," not something that will report the condition of adjustment—that will do no good, but something that will adjust.

Possibly I may have to use some of the coupling devices discussed in the AMERICAN MACHINIST, and never adjust the alignment with set screws and wedges.

Fig. 1.

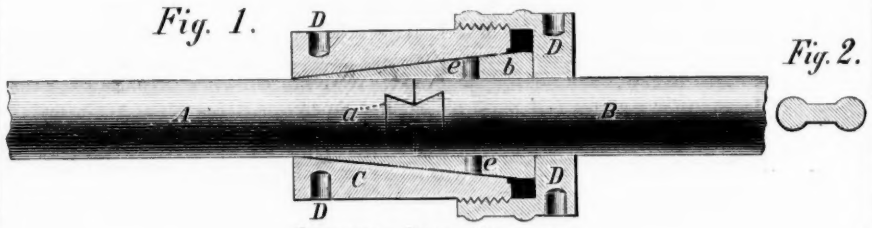


Fig. 2.

IMPROVED SHAFT COUPLING.

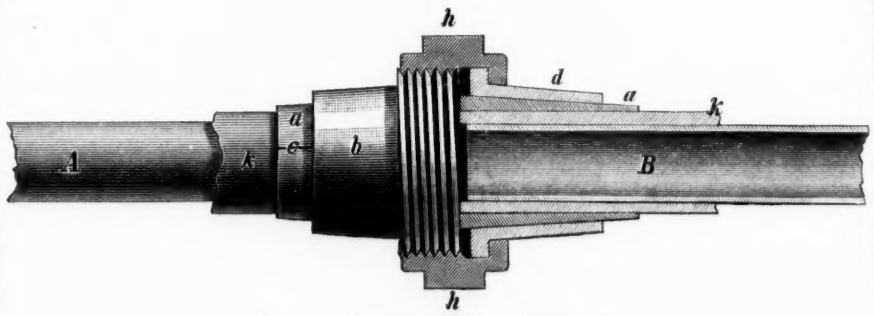


FIG. 3.—IMPROVED PIPE COUPLING.

* * * * * * *

I wish to know what pulleys to use. They ought to be light, not altogether because their added weight creates friction, but because their weight springs the shaft and aggravates friction. I am in need of information regarding the wrought-iron rim. If it is light and strong and cheap and durable, I want to find some other reason for not using it.

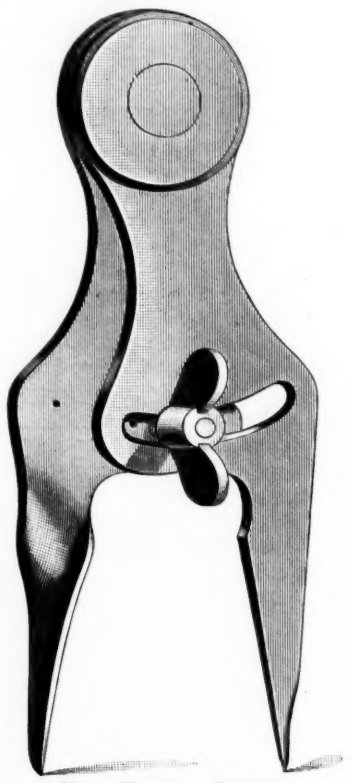
Tool for Cutting Washers.

An engraving upon this page represents a very useful and convenient tool for cutting washers of all kinds.

It was invented by our correspondent, T. F. Hagerty, for his own use in pattern and model making, and proved so well adapted to its purpose as to determine him to secure it by patent and present it to the consideration of tool manufacturers and users.

Pattern and model makers often require to cut a circular piece of wood or paper to secure to a pattern as a "hub" or "spotter."

Without such a tool as this, they must either chuck the piece and turn it in the lathe, if of wood, or describe a circle with a pair of dull pointed compasses and cut off the outside stock with a chisel or knife, and finish up with a file and sandpaper. This little tool (shown exact size by the engraving) cuts with ease perfectly circular disks or rings, which require no finishing, from a half inch to four inches diameter, in half inch stock if of soft wood.



NEW WASHER CUTTER.

Mr. H. says, "The time saved by it in making one set of patterns for a small machine more than paid for the time it took me to make the original tool by hand, which was half a day."

No dividers are necessary with this tool, as the size of the circle or washer to be cut can be taken with exactness from the rule. The tool is very simple in construction. Both sides are cut with the same die.

The address of its inventor, Thomas F. Hagerty, is 4 Henrietta Square, San Francisco, Cal.

Improved Shaft and Pipe Couplings.

The subject of shaft couplings has of late been pretty thoroughly discussed in our columns, and one would naturally suppose that the subject had become exhausted for the lack of material to form the basis for discussion.

The reader would very probably get the idea that all the couplings possessing any claims to representation had been pretty well described. But it appears that such a conclusion is erroneous, from the fact that the shaft coupling shown by the accompanying engraving is entitled to a place among those that have proved successful.

A longitudinal section of this coupling is shown by Fig. 1, where *A B* represents the ends of the shafts. A slot is cut in the end of each shaft for the reception of the key *a*. This key may be made in different shapes, *i. e.*, it may consist of a plain rectangular piece of steel, or of the shape shown in Fig. 2, but the best form is probably shown at *a*, as it is easy to fit, and prevents the ends of the shafts from moving or separating endwise. This key also aids the coupling in performing its work. The coupling consists of a shell *C*, which is bored tapering at one end for the reception of the annular wedge *b*, which is split in two and is forced to its place by a spanner wrench applied to the screw cap *D*.

The shell *C*, is prevented from turning by the application of a wrench to the holes *D*.

The annular wedge may be made by cutting it through upon one side, and nearly through upon the other, leaving only a thin web of metal to hold it together, allowing it to close freely around the shafts; or it may be separated entirely and the two parts be held in proper position by two projections placed at *e*. The coupling as shown, is intended for light shafting, where the ends of the shafts are of a uniform size; but where the ends are of a different size, and where heavy work is required, the shell *C*, is made longer, and has another nut and annular wedge, furnishing a distinct coupling at each end. In the place of the cap *D*, a flange is used, which is held to the shell *C*, by bolts. The latter construction is called a compound coupling.

A very simple and efficient pipe coupling is shown in Fig. 3, which represents a longitudinal section of one-half of coupling and pipe. It consists of an ordinary threaded male and female coupling collar, which works upon a conical sleeve, divided longitudinally in connection with a section of flexible rubber hose, or other elastic tubular packing.

A B represents the ends of pipes to be coupled. A conical sleeve *a*, is provided, tapering towards either end. This sleeve may be cut from end to end as shown at *c*, or it may be divided into two or more parts longitudinally. It might be desirable to bore it out somewhat larger towards the center, so as to insure a bearing at the ends around the pipe when closed together by the collars *b* and *d*. These collars are bored out to correspond with the conical shape of the sleeve. The collar *d*, is flanged to receive the threaded coupling ring *h*, to which it is swiveled, as shown, and said ring *h*, screws upon the threaded section of collar *b*. The joints between the ends of the pipes *A* and *B*, are thoroughly packed by means of the section *k*, of rubber or other suitable tubular packing. To apply the coupling, the two ends of pipes are thrown out of line, and the sleeve containing the tubing and collars placed upon one end of pipe, when the pipes are brought into line, the coupling slid over the joint, and the nut tightened, which closes the sleeve, thus compressing the rubber firmly upon the pipes.

This style of coupling is useful upon long pipes, and where a certain motion is required for expansion, also in situations where it is inconvenient or impossible to use a thread upon the ends of pipes.

The couplings herein described were invented and are made by W. B. Dunning, Geneva, N.Y.

We have frequent inquiries in relation to a rule for ascertaining the actual H. P. of steam engines, and these inquiries come chiefly from apprentices and mechanics who seem to understand very little about arithmetic. For this class of our readers we give the following: To find the H. P. of a steam engine, multiply the diameter of the piston in inches by itself, and this result by .7854, which will give the area of the piston in square inches. Multiply the area so found by the speed of the piston in feet per minute, or if the speed is taken in inches, divide the product by 12. after multiplying. (Speed of piston is found by multiplying twice the length of stroke by the number of revolutions per minute.) Multiply speed of piston by the mean effective (average) pressure of steam upon the piston (which can only be determined by applying the indicator), and divide the product by 33.000, which gives the actual H. P.

LETTERS FROM PRACTICAL MEN.

Mechanical Drawings.—A Tool Holder—Device for Turning Gas Pipe.

Editor American Machinist:

I have been watching the various discussions going on in the AMERICAN MACHINIST for some time past, and, being a draftsman, those on shop drawings have attracted my particular attention. I am glad that some one agrees with me, and that that one is "Chordal." I always add a few explanatory words to a drawing to make everything clear, as he does on his bolt. Looking at the drawings in issue of April 21, I would have taken the head of the bolt to be hexagon except where its shape is dotted on—a rather confusing way to show it. In "Chordal's" particular drawing it is worked in plain English "square," and shown in a way which makes it obvious at a glance that it is not "hex" or octagon.

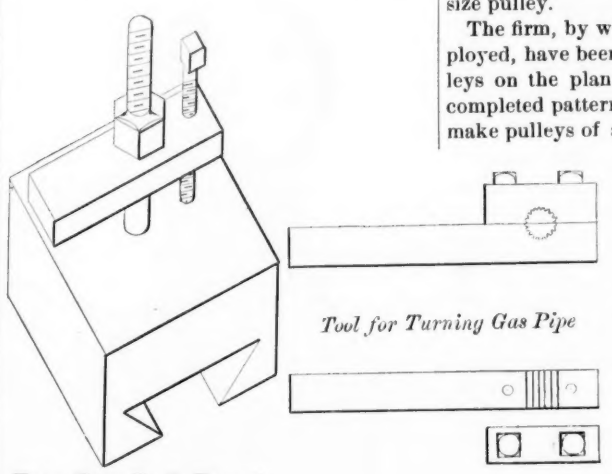
Mr. Hemenway's remarks on theory and practice show that he has that which is so much boasted of and yet so often lacking—common sense.

I never found any trouble with ordinary tool posts, but send you a sketch of a very strong and rigid modification of Whitworth's which I have often used. It was designed by an old instructor of mine, P. B. De Schweinitz, C. E.

At the shop where I was last employed we had to turn up a lot of ⅝" gas pipe in lengths of 20". Now every machinist knows that gas pipe is an abomination to turn. Our foreman suggested milling, and the result was the tool shown in my sketch, which was used in the tool post of one of our lathes with excellent results.

L. O. DANSE.

Pittsburg, Penna.



Tool for Turning Gas Pipe

TOOL POST (L. O. DANSE).

Drawings that Won't Stay in Good Order.

Editor American Machinist:

I have been reading Chordal on drawings for the shop, and am completely mixed up. One minute I agree with him, and the next I don't. In "the shop where I work" (as Artemus Ward says in his beautiful romance, Isabel Sawtelle, wherein he proves, much to my satisfaction, that it is always best for rich men's daughters to marry mechanics) the drawings are glued on boards, or thick pasteboard, and varnished, and in the operation the paper generally stretches, and the result is that some one starts for the drawing room to remark: "Say, this drawing measures two inches and a thirty-second; what is it meant for—two, or two and a-sixteenth?" And when informed that two inches was the size intended, he wants to know "why in blazes don't you make your drawings so a feller can tell something about 'em." So the patient draughtsman gets a piece of sandpaper and polishes down the varnish, and marks every size on the drawing, which is then varnished again, and everybody is happy. Not so, however: in about six months, when the same drawing is brought forth to work from again, and has shrunk, from various causes, so that the two-inch piece measures under size, then this same man starts again for the drawing room, and says, "This piece measures a little over one and fifteen-sixteenths, and is marked two inches; which do you want it?" He is informed two inches. Then he says, "Here is a piece marked one and eleven-sixteenths, and I haven't got any reamer that size. Why can't I make it one and three-quarters?" And on being told there is no objection, says: "Well, what did you mark it for if it don't make any difference—s'pose I am going to make a new reamer every time I build a machine? I don't get enough for 'em, by a jug full," and goes out muttering something about boys three years old, and swapping them off for dogs, and shooting the dogs. I don't know whether this is an argument for or against the idea of marking drawings; but if the shape, as well as the size, is to be marked, why not go a little farther, and mark "run," "drive," and "twist in," because I have known a man to drive in a stud that should have been a running fit, and then swear because the machine "wouldn't work;" and I know another man, who went in with a new drawing in his hand, and said: "Say, this drawing ain't like the old one. Did you mean to make it different, or did you make a mistake?" But I am already in the condition Josh Billings was, when he tried to decide which came first, the egg or the hen, so will stop before I am tempted to go to lecturing.

GREASER.

Moulding Pulleys.

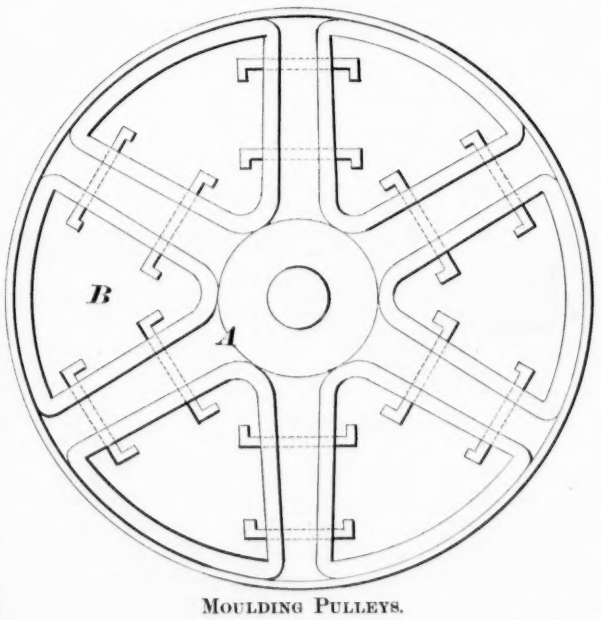
Editor American Machinist:

Having taken your valuable paper for the last eighteen months, and having read the many communications with a desire to be profited by them, I feel like thanking my brother moulders for their views on the various branches of the business. I think G. E. Stauffer's mode of making pulleys in green sand is a good one, part of the way, but he stops too soon.

He says he has a man who has made a 54" pulley, 16" face, with two sets of arms, in half a day.

He says nothing about the time it took the core maker to make those cores, the cleaner to chip the pins, and make the casting look as it should look, and the cost of flour and sand for the core.

Now let Mr. Stauffer make a full pattern for the arms and lifting plate for the same,



MOULDING PULLEYS.

and his moulder can make the same pulley in less time, and save the expense of making cores and chipping, besides having a neat-looking pulley when it is done.

With his arm pattern cast in iron, he can make his pulley any desired width; and with one or more sets of arms, as may be desired.

I have seen two 48" pulleys, having a 12" face, made by the following plan in less than five hours, by one man, without a laborer.

Have a one-inch hole bored in the center of the arms, and you can use a hub of any desired size.

The plan is to bed the arms in the sand, at the desired width, to form half the pulley. Make the joint around each arm; bed down your lifting plate; ram over the arms; draw your rim to the desired height; ram your cope; draw out your rim, then lift out your plates, draw the arms, and finish your mould. I think this plan preferable to that of Mr. Stauffer's.

In the accompanying engraving, *A* represents the arms, and *B*, the lifting plates. Now then, how would Mr. S. make split pulleys by his method? I believe patterns in halves give us the quickest way to make pulleys, but for the many patterns for each size pulley.

The firm, by whom I am at present employed, have been in the past making pulleys on the plan of Mr. S., and have just completed patterns from 16" to 36", and can make pulleys of any desired width of face, split or solid, and prefer the present plan; they have tried both. By the way, Mr. Editor, our little town of Raritan is quite a prosperous village, with two woollen mills, employing about 800 hands; beside one enterprising firm of general machinists, who at present are busy manufacturing woolen machinery. This firm, last year, extended their machine shop to double its original size, and still talk of extending. May the good work go on, and may they be driven to extend and annex from year to year. Prosperity to employers means prosperity to employes.

A. MOULDER.

Raritan, N. J.

Method of Copying Drawings.

Editor American Machinist:

I have been using a way of taking copies of drawings for shop use, which may be of some value to those who are not too high-toned to use it. I make my original on thin white paper, 16" x 22", the same as is used where I get my sensitive paper for sensitizing. I believe it is water lined "Record." I then have sensitized paste board of a good quality, and white, of the same size as the paper, and transfer my drawing at once from the original paper. After washing the board, I pin it up (with the corner down), at the four corners, against a vertical board, and let it dry. When dry, I find there is very little buckle in it, if any at all. This makes (for me anyway) a good substantial copy, that can be put in a rack, on a lathe, or hung up on the wall by putting an eyelet in it. I always make my drawings for the shop in Chordal's "schoolboy" style, and figure them, whether full size or not. I give the idea for what it is worth; and I don't care whether anybody adopts it or not. It is a first rate one for me, and if any one has any *better* and *quicker* way of taking copies, I wish he would speak up (or write up.)

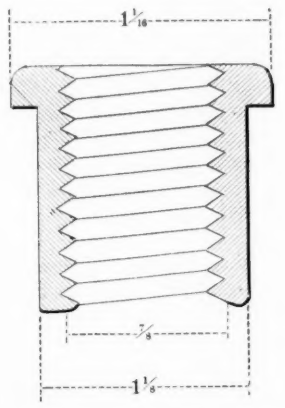
I wish Chordal would answer that question "Why not?"—in reference to putting in center lines—himself. I make use of it to lay out nearly all my sketches. I make all my measurements of a figure on my center line, unless the piece is so irregular in shape as to make it impracticable to do so. And when done, I ink it in for future reference for the same purpose. I don't think there is any "why not" about it. While it is not always absolutely necessary, it is nearly always extremely convenient. I should doubt the correctness of a drawing that was laid out without it, as to its being alike on both sides. I don't mean to say that I figure my sketch on the center line; I know better than that, but I mean to say that I use it to make measurements in laying out.

Catasauqua, Pa. CENTER LINE.

Tapping Holes With Thimbles.

Editor American Machinist:

In fitting water wheel spiders to their cases it is necessary that the bolts that fasten the spider to the case should be a good fit, as the whole weight of the wheel, shafting and gearing is supported by the bolts. The case and spider are drilled together—the same size hole in this case extending in the spider about ¾ of an inch for bolts of 1¼" diameter. With a tapping hole ¼" diameter and 1½" long; after the drilling is finished a thimble 1⅛" diameter, with a ⅞" thread through it (see sketch) is slipped in the case



and the spider tapped before it is taken out. This plan has been used with good results in our shop for years, there being no trouble whatever in making the body of the bolt a good fit. In some cases we make the thimble fit the shank of the tap, which is the best plan, for if the tapping hole should have run much, the tap has not such a chance to wear the thimble. The thimbles are made either of cast or wrought iron.

"VULCAN."

Port Perry, Ont.

The Classification of the Subject Matter of Mechanical Books.

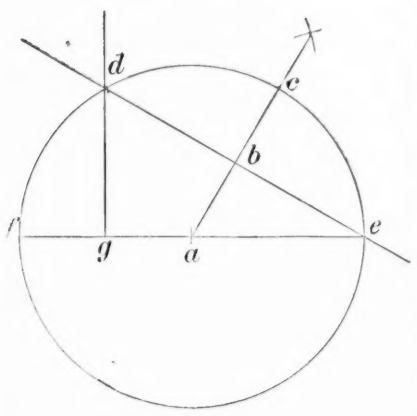
Editor American Machinist:

The possessors of dictionaries of mechanics and of cyclopaedias upon mechanics, arranged upon the dictionary system, will, I think, agree with me that under an alphabetical arrangement of the subject matter the reader finds great inconvenience. For example: In a mechanical dictionary the subject matter is obviously elementary, and upon any one mechanical subject the matter bearing upon it is widely diffused. Suppose the subject requiring to be studied or investigated be the devices employed to secure one part or piece to another; then we have, as mechanical devices, set screws coming under *S*, keys under *K*, feathers under *F*, bolts under *B*, double and single eyes under *E*, pins under *P*, cotters under *C*, and so on. Again, take the subject of measuring tools: calipers under *C*, verniers under *V*, cylindrical gauges under *G*, measuring machines under *M*, and so on. Now, to isolate mechanical devices employed for similar purposes in this way, has several decided disadvantages, because some one of them, if not more, is present in almost every machine, and as they are all locking, holding, or attaching devices whose applications are very largely subject to selection, requiring in many cases considerable judgment, they should evidently be discussed together. Nor is there any good reason why they should be treated disconnectedly, in order to arrange them according to the particular alphabetical letter that happens to stand first in the spelling of their names. There is a great advantage, however, in classifying them and grouping them according to their uses, because their comparative merits may then be clearly shown. Furthermore, the elementary parts common to most machines, should evidently be understood before the operation of a machine can be intelligently understood from a written description of its parts. Even in the classification of machine tools themselves, the importance of the tool should govern the order of precedence. Thus, the lathe is the most important machine tool. Within its operations are included in substance a use of very nearly all the holding devices, tools and appliances, used on all other machines combined, and it follows that it should be treated before other machine tools. Indeed, among a very large proportion of mechanics (and probably a majority of mechanics) the lathe

hand is judged to be capable of operating any other machine tool. In the trades unions this is carried so far, that a lathe hand or turner is eligible for membership, though he may be working, at the time of admission, on a planer or slotter. But a planer hand or a slotter hand is not eligible to membership, it being considered that in operating these machines there is not involved enough mechanical skill to entitle the operator to recognition as a skilled mechanic. Why then should "Lathe" be treated after all other machine tools whose names begin with a letter coming before the letter *L* in the alphabet, especially as this involves, to be intelligible, several anomalies? For example, chucks and other devices, also cutting tools that are more generally employed upon the lathe than upon the drilling machine, should be described in connection with the lathe and not with the drilling machine, as would be necessary under the dictionary system, because, in this system, *D* precedes *L*, and "drilling machine" therefore precedes "lathe." In short, in mechanics there is a regular order of progression from device to device, from machine to machine, and from operation to operation, and as this order does not proceed alphabetically, it should not be so arranged in books upon mechanics.

JOSHUA ROSE, M. E.

New York.



Calculating Laps and Port Openings.

Editor American Machinist:

In making and repairing slide-valve engines it is often necessary to calculate the lap required on valve to cut off steam at a given point of the stroke, and to know what the port opening will be.

Even with books and travel scale at hand it takes some little time to figure it out. By the following graphical method, the answer can be obtained in five minutes by any one, although he may not know the multiplication table: From the center *a*, describe a circle with the diameter *f e*, equal to the travel of valve. Suppose we want to cut off at three-quarters stroke, lay off *e g*, equal to three-fourths of *e f*, at *g*, erect a perpendicular cutting the circle at *d*. Draw *d e*. From the center *a*, draw *a c*, cutting *d e*, at center *b*, and cutting the circle at *c*. Then *a b*, will be the required lap and *b c*, the port opening. If you want to cut off at $\frac{5}{8}$ or $\frac{7}{8}$ stroke, make *e g*, equal to $\frac{5}{8}$ or $\frac{7}{8}$ of *e f*.

JOHN C. DEAN.

Indianapolis, Ind.

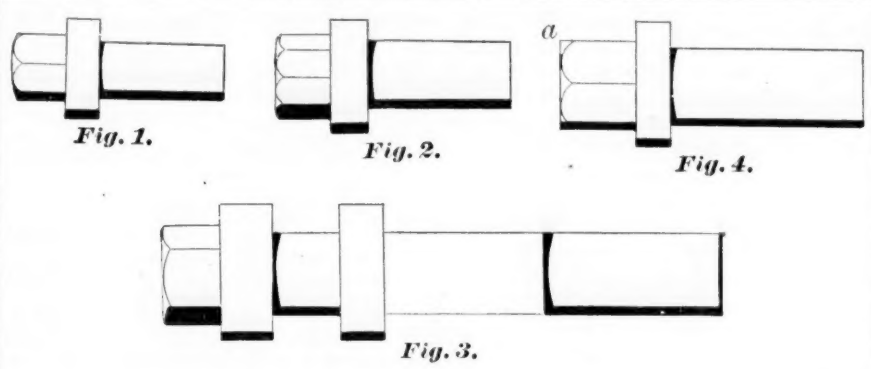
Instruction in Drawing Wanted.

Editor American Machinist:

I see by Quirk's letter in your issue of April 16th, that he advises the apprentice to invest in a case of drawing instruments, and adds, "the needed instruction will always be readily obtained." Now, I would like to ask Quirk if he would be kind enough to inform me where I can get the "needed instruction." Our foreman is thick-headed; he cannot draw a design of any kind, and would not recognize an apprentice outside of the shop, as he belongs to the (shoddy) "aristocracy." I wish to learn mechanical drawing, and am at a loss to know where to get the necessary information.

APPRENTICE.

West Philadelphia, Pa.



Drawing Square, Hexagon and Octagon Bolt Heads.

Editor American Machinist:

I noticed in the AMERICAN MACHINIST, April 23, 1881, page 3, some drawings, and the question, Is the head to be square, hexagon, octagon, or what?

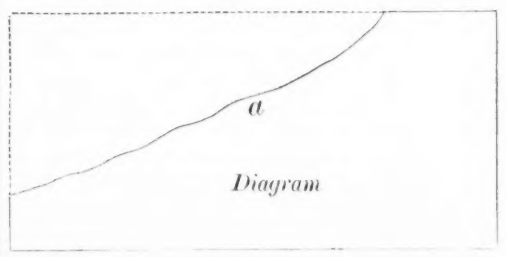
Hexagonal heads should be drawn like Fig. 3. Octagonal like Fig. 2, and square like Fig. 1.

All the bolt heads on page 3 are drawn like Fig. 4, with corners at *a*. This is wrong. There are no corners on a bolt head that is turned off in a lathe (at the point *a*).

I think rounds, squares, hexagons, octagons, etc., shaded like Fig. 3, are plain as to what the shape is, and ninety-nine in a hundred would need no one to explain it to them.

N. H. BALDWIN.

Laconia, N. H.



New Way to Find Area of a Diagram.

Editor American Machinist:

To find the area of the above diagram: Draw the diagram on uniform paper, and cut it along the irregular line *a*; then cut, from same quality of paper, pieces containing units and decimals of surface measure. With these pieces of paper as weights, and with a delicate balance, weigh the diagram, the weight of which will show the area. The ratio of the area of a part with the whole, as shown by dotted lines, is readily ascertained either by figures or weight. The diagram may be enlarged to any size by means of the pantagraph, and areas calculated with less error. Now, what I want to know is, Can this operation in "machine mathematics" be employed in calculating indicator cards, provided we have very uniform paper and a delicate balance? My private opinion is that it can be. The paper upon which the diagrams are taken should be very uniform with the paper of which the weights are made. The balance should be very delicate, and the weights marked, in nests, from units to the smallest fractions.

Dubuque, Iowa. A. FORREST.

Age of a Valuable Style of Piston-Rod Packing.

Editor American Machinist:

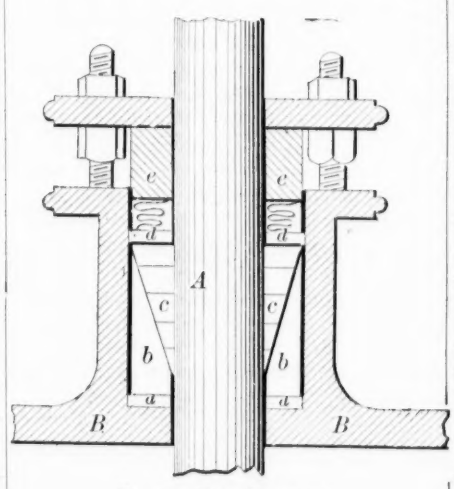
Having read with interest the paper of Mr. Lyne on packing for piston rods, etc., presented at the late meeting of the American Society of Mechanical Engineers, and thinking that the following in the history of such packings may be of interest, I venture to enclose it.

The annexed sketch represents the metallic piston-rod packing of Messrs. Allen & Noyes, patented about 1847.

This packing I introduced very successfully in many engines—marine, stationary, and locomotive; it was used on the piston rods of the steamers Pacific and Baltic, of the famous "Collins'" line of steamers, and continued in successful use so long as those steamers were running. I also applied the same packing in the trunk engines (trunks, 30 inches diameter) of the propeller steamers City of Pittsburg, and Pioneer; in its application to locomotives I have used it for packing the piston rods, valve stems and feed pumps, with success. A large number were also fitted to stationary engines.

The diagram annexed represents the stuffing box of a locomotive cylinder, in which this invention has been proved, and exhibits the method of construction. The stuffing box of a cylinder, made in the ordinary way, is bored out truly, and the annular portion of its bottom, between the sides of the box and the orifice, through which the piston rod plays, is turned or ground down smoothly and truly at right angles, to the axis of the piston rod; upon this annular bottom is placed a brass or composition ring, in the diagram marked *a a*, of, say, a quarter inch thick, fitting snugly within the box, but having a play of, say, one-eighth of an inch around the piston rod. This ring is ground and fitted truly to the annular bottom of the box, and has its upper surface made truly parallel with its lower one. On this ring is next placed a brass or composition cup, which is called the vibrating cup. It is externally a cylinder one-eighth of an inch less in diameter than the stuffing box's bore, and two and a-half inches long. Internally it is so shaped as to receive, in addition to the piston rod, as its matrix or bed, the metallic packing hereafter described, conforming and fitting to it truly, as shown at *b b*; its lower surface is also truly fitted to the ring *a a*.

The packing, which may be made of brass or composition metal, or babbitt metal, which last we used and preferred, consists of several rings (we have used five of half an inch thick each) ground truly to each other, fitting accurately with their internal edges to the piston rod, and having, when laid one on the other in their place in the cup just described, externally the shape of a frustrum of an inverted cone, whose upper or greater



PISTON ROD PACKING.

diameter is one-eighth of an inch less than that of the bore of the stuffing box, and its lower and lesser diameter, taking out sufficient metal at the cuttings to allow a contraction of the circle of the rings, as the wear of their internal surface against the piston rod causes their parts to approach the centers of their circles; on top of the conical rings is placed another brass or composition metal ring, marked *d d*, similar to the lower one *a a*, in all respects, and accurately ground and fitted to the topmost packing ring. Upon the top of this ring, or else attached to the bottom of the cap or cover of the stuffing box, are to be placed one or more springs of a spiral, elliptical, or any other form convenient, for the purpose of keeping a suitable pressure upon said ring, the effect of which will be to depress the packing into the conical-shaped chamber of the vibrating cup, and thereby thrust the packing inwards, so as to embrace snugly the piston rod, and effectually prevent the escape of steam or ingress of air along the rod; whilst the accuracy of the fitting of the outside of the packing to the cup, and of the rings to each other and to the bottom of the stuffing box, will prevent escape of steam, or entrance of air in any other direction.

The cap of the stuffing box is formed in the usual way, leaving a sufficient space below its lower surface and the upper ring, for the introduction of the springs. For the purpose of conveniently regulating the pressure of the springs upon the packing, in addition to the nuts employed to screw down the said cap, a set of nuts are used underneath the cap, so as to hold it exactly in any desired situation, and give a fixed pressure upon the packing. The object and intention of the *vibrating cup* is to afford that *lateral motion* to the *piston rod* in the stuffing box, which necessarily arises in the best made machines from wear of parts, loosening of joints and other derangements, especially in machines, which, like locomotives, are driven with great velocity over irregular surfaces, and made to undergo great straining of parts, and which *lateral motion*, if imparted to the conical packing, lying in an unyielding matrix or bed, would force it up obliquely to the line of the axis of the piston, and soon wear into irregularities the surfaces of the rings on each other and also on the piston.

After the patent expired, it was no one's pecuniary interest to push its introduction, and the use of it gradually expired.

New York. CHARLES W. COPELAND.

Counter-balancing Engines—Chordal's Bolt Drawing.

Editor American Machinist:

Quirk kindly notices my method of counter-balancing engines, by stating that the "rules laid down for measuring irregular surfaces are very good, but these won't balance an engine." I was not aware that I had made any such claims, nor was I aware that I had made any "propositions" of which he claims to have discovered an error in the "first." I will submit a proposition, however, for Quirk to demonstrate, viz., that "it is evident that the combined movement of a crank and cross head throws more than half the weight of connecting rod on the wrist pin."

His letter referred to locomotive drivers, affording an excellent illustration of his "plan, heretofore given." I quote his plan, and let your readers judge of its adaptability to produce even an approximated balanced driving wheel. "Extend the weight through 130° of the circle, and from the rim to the hub, by radial lines running to the center of main shaft." The amount of "weight" distributed within those limits, he presumably obtains by the "rule of thumb;" at least he discloses no other way of determining it. As to balancing the reciprocating parts by cushioning the piston, he thinks it "amounts to but little, practically," notwithstanding his thoughtfully adding to his plan above quoted, "I must say, however, that my success was greatly owing to having the proper amount of cushion at each end of cylinder. Without this an engine cannot be balanced, etc."

I give the following method for balancing locomotive drivers, letting your readers have a chance for at least a choice. For outside cylinder, coupled engines, take the weights of both reciprocating and revolving parts, exclusive of half of connecting rods, cross-head or piston, as the weight to be balanced. Fix upon the shape of the counter-weights, and ascertain centers of gravity as before.

If two or more counter-balances are to be used together in the same wheel, a common center of gravity must be found for all. This is done by laying them off on paper to full size, or scale, and drawing an arc

through the centers of all the proper distance from the center of the wheel or axle.

In case of three counter-weights, connect the centers of gravity of the two outer weights by a straight line. Divide, in three parts, the distance between the middle of this straight and the curved line cutting the centers. At one-third distance from the straight line will be the common center of gravity.

For two weights, side by side, let the common center of gravity be taken at the same distance as the center of gravity of each weight, from the center of the wheel.

If I were going to make "Chordal's" bolt, I would like to know whether the corner between the $\frac{3}{8}$" round and $\frac{3}{8}$" square part was to have a fillet or to be a square sharp corner. His drawing discloses neither.

If a sharp square corner the line would "die out," or vanish on each side of the center as it approaches the round part, and if to have a fillet then it would terminate at the same place with a curve toward the round end of bolt.

Macon, Ga. Robt. V. Kinney.

Bureau of Labor Statistics.

Editor American Machinist:

In a recent issue of a scientific journal there appears an editorial under the above heading, reflecting upon the proposed organization of a Bureau of Labor Statistics in New York State, under the auspices of men who were selected, or named, by the trades' unions and other organizations, as competent persons to act as commissioners.

The constant attacks of this and other journals, supported in the main by workingmen, are both unjustifiable and uncalled for.

The objects sought to be obtained by the creation of such a bureau are to collect, assort and systematize statistical details relating to all branches of productive and distributive industry, as a guide to determine what legislation may, from time to time, be requisite to advance the interests of the industrial classes. The bill as drafted by these societies provides for the appointment, by the Governor, of two suitable persons to act as commissioners, at a salary of $2,000 each per annum; one of whom shall be selected by and from the labor unions, and the other by and from the provident societies.

The scientific journal comments as follows: "With wisely chosen commissioners, and a bureau properly organized and administered, not a little public good might result from the collection and publication of statistics of the sort described. Organized as proposed on a narrow trades union and provident society basis, the wished-for bureau would, we fear, be of very little use to the community as a whole, and still less to the laboring portion of it." If the selection of persons recommended by these labor organizations is what the journal referred to controverts, from what class of society would they have them chosen? And how should such a bureau be organized to meet their views? To say that a Bureau of Labor Statistics, under the management of two honest and competent men, selected from labor unions or provident societies, would be of little use to the community, is a base slander on the working classes. If two-thirds of the present legislators of New York were chosen from the members of trades' unions and provident societies, there would be no such howl as we hear through the press about the filthy condition of the streets of your ring-ridden city.

Mr. Editor, the very impartial stand which you have taken in these labor questions, and such fair editorials as appear in your journal, condemning unreasonable demands from any source, meet the approval of all unbiassed men.

If there is one thing more than another that has caused such wonderful development in our agricultural and mechanical progress in so short a time, it has been that freedom from class restrictions and independence of action, which has prevailed between the working classes and their employers, and which has heretofore been our boast when comparing American with European labor. England under her class rule has dwarfed the intellects of her workingmen, and during a century has limited the production of noted mechanics and scientists to very few, not half of whom sprung from the work bench. Contrast American mechanical progress with other nations, and record names of the thousands of great men who in a brief space of time have come prominently into notice as scientists and mechanics, and into business as successful manufacturers in all branches of industry.

The establishment of a Bureau of Labor Statistics in the State of New York, would be of vast importance in furnishing useful information, not given in the census reports. Several states have established such Bureaus with excellent results.

The Governor of this State (California), in his message to the legislature, urged with marked ability and earnestness, the immediate creation of such a bureau. The Trades' Assembly, of this city, appointed a committee, of which the undersigned was a member, to draft a bill and present it to the legislature. We did so, and but for the early adjournment of the legislature, we would have succeeded in having it passed.

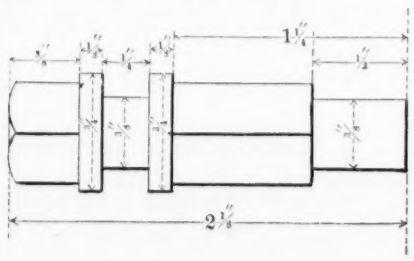
San Francisco, Cal. T. F. Hagerty.

Another Plan for Drawing.

Editor American Machinist:

There has been considerable controversy in regard to the proper way a bolt should be represented in detail for "shop use." With all due respect, and good intentions towards those who have thus far contributed, I most respectfully beg to differ from all. I agree with Chordal in all he has said about the different plans submitted, except what he says of his own "school boys' plan."

The first question a man would naturally ask Chordal would be "How large do I want to turn that part to be squared $\frac{3}{8}$", so as to leave the least amount of stock to be filed, milled, or planed?" Chordal might say, "Why, multiply the square by the constant, 1.414; that's all you have to do to get the distance across the corners; thus $\frac{3}{8}$" =.375, which, multiplied by 1.414=.520; $\frac{17}{32}$"=.531, so $\frac{17}{32}$" would be about the size." I would have said that any young man has a perfect right to copy this constant 1.414, and put it in his book of memoranda, so handy for reference at times, and never injurious." After all, I don't believe Chordal would say that to the man. He would frankly acknowledge the drawing was incomplete, and go and make an end view, with the figures all on for the poor fellow. Then he might say, 1st. Lathe tools *are* cheaper than files. 2nd. It's money out of some man's pocket for any one to guess at a thing (generally), or to go and look up some one for an explanation; and I think, after all, that an "end view" finishes the job. It's all there. A man who couldn't understand two simple views, certainly couldn't understand one. I don't think it a good plan to mark lathe work "round." It's generally understood by lathesmen that their work is round, unless otherwise stated, either by printing, or illustrated by drawing. I always make it a point, where possible, to make all squares cornerwise, as per sketch; also, hexagonals with three sides (3), showing on all its elevations. I enclose a drawing of the bolt—construction lines I make with *scarlet vermilion*; dimension lines full, with *ultramarine blue;* witness marks and figures *black*.



2—OF GOOD IRON.

This shows the way I make detail drawings for the heterogeneous mass of shop-help, consisting of educated, skilled, and uneducated hands. I trust it will explain itself fully. G. H. Smith,

Head Draughtsman Brown & Sharpe Mfg. Co., Providence, R. I.

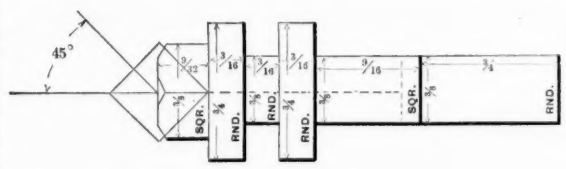
Some Considerations in Making Drawings.

Editor American Machinist:

Carter's drawing, in a recent issue, explains itself to a well-posted workman, but sometimes in short, irregular work, would look confused. I think as he does, that a good line drawing cannot be improved. Friend Smith gives us a regular old line sermon. We will have to take a lunch to hear it out, or go on the Tanner principle. As for his omitting measurements, ignoring from what place the light comes, and then talking about shading drawings—which of these shall we strike out, so it will read easily? Fuch's hits the nail on the head. There ought to be a regular system, and when this comes about, we shall see the millennium. Chordal tells of sending a drawing a thousand miles without a written explanation. The simpler a system can be, the better, as all machinists cannot understand a drawing made by a draughtsman, who is making, as he conscientiously believes, a drawing in its most intelligible shape. If more draughtsmen were obliged to go from the scrap heap, through the blacksmith shop, foundry, machine room, and pattern shop, to reach the places they fill, they would be better fitted for their positions.

I should like to ask Chordal how long that belt was intended to be. For instance, if a man made one on the scale that the body was, $\frac{3}{8}$ inch, and another, that the collar was $\frac{3}{4}$ inch, and one fitted the other, it would require some power capable of joining bodies, which otherwise would have remained at a perpetual distance, or when in its place if close fits were required, it would look worse than some of those horridly mangled couplings we have seen lately.

When I commenced, I said something about a drawing. Here it is. It does not differ much from Chordal's school boy system. The dimensions are given on the top of each section. In the example we have had, I have seen no way yet which would tell whether the head was square or hexagonal, and in some cases these should stand at a definite angle with each other. Here one drawing shows it. All sections should be in red ink.



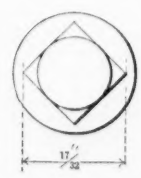
I do not claim this system as an original idea. I have copied good paints, as I thought, from time to time, and having made drawing patterns, and finished the article, when cast, I knew some of the troubles draughtsmen should correct and make easy for the workman. In my humble opinion, a drawing should be an illustrated rule, and not a drawing room ornament.

Mechanic Falls, Me. E. F. Edgecomb.

Can our Mechanics Use the Metric System?

Editor American Machinist:

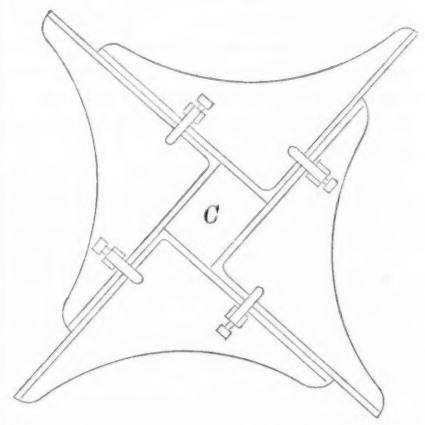
Kindly permit me to rise in my seat and protest against what I believe are the quite improbable suppositions floating in some of the papers, that American machinists and similar workmen would find it impracticable to work to the measurements of the French metric system. So far as I have observed, the arguments (?) advanced to prove that the thing cannot be done have consisted chiefly in saying that it cannot be done, and that hence (?) it cannot be done; which is, as a lawyer would say, as complete a *non sequitur* as one could well find.



To say that the use of the metric system is inexpedient in our American shops is one thing and quite a possible thing too; but to say that American workmen cannot, with entire readiness and absolute correctness, adopt and use the metric measures, is to say what at least has not been proved.

I believe there are few who will admit that the average American skilled workman cannot do any reasonable thing; and I submit that to use a decimal sub-division of a unit of measurement is a reasonable thing in the fullest sense, whatever the unit of measurement may be. At any rate, it is in this direction that I wish to enter and urge my protest. P. Barnes.

Springfield, Ill.



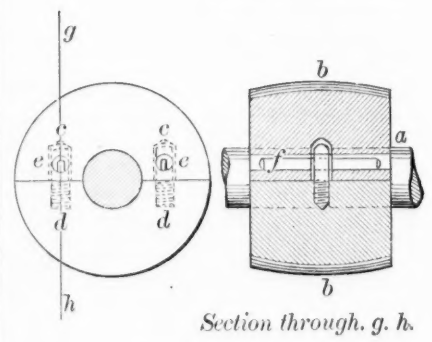
Adjustable Core Box.

Editor American Machinist:

The accompanying illustration represents the end view of a core box, made by the writer whilst serving his time as moulder, at the Motala Iron Works, Sweden. It consists of four rectangular pieces, clamped together by four screw clamps at each end, and can be used only for four-sided cores; but can be set to square or rectangular sections of any desired proportions.

The sides of the core box need not be parallel, but can be set to the form of a wedge or a pyramid; or square in one end, and rectangular in the other. Either end of the box can be set to a sharp line or point in one end, whilst the other end may be a square or rectangle.

John W. Nystrom.



Section through, g. h.

Shop Kinks.

No. 10.

A CONVENIENT SMALL SPLIT PULLEY.

By L. F. Lyne.

It is frequently desirable to place a small pulley upon the main line of shafting for the purpose of driving a grindstone, or some special machinery. If the pulley is to be, say, of 12" diameter, or upwards, an ordinary split pulley is used, but if the diameter is about 6" to 8", it is a more difficult matter to supply the requirements. While engaged in a railroad shop a plan was adopted of placing a countershaft upon the floor and using it as a medium for transmitting power from the main shaft to the gearing upon a boring bar, for boring cylinders upon the engines. A pulley was made, having lugs upon the outside, with holes drilled for the application of four bolts for holding the pulley together. We were constantly annoyed through the belt getting caught in the lugs and tearing it to pieces, so I adopted

the plan represented by the engraving presented herewith.

The lugs were taken off the pattern, and two pieces were cast, as shown, without any projections. Holes were drilled and tapped for the studs *d*, while the holes in the other half of pulley were large enough to admit the studs. Two holes *e*, were drilled longitudinally through the pulley for the reception of the steel keys *f*, for holding the pulley together. The keys were driven after placing a piece of sheet iron $\frac{1}{32}$″ thick between the joints, and the pulley bored to fit the shaft. After boring, the sheet iron was removed, and the pulley placed upon the shaft *a* and keyed fast. By adopting this course there were no projections left upon the pulley to catch the belt, or the sleeve of the workman, besides the pulley had a neat appearance when placed upon the shaft. I once had one of these pulleys 8″ in diameter, which could be used upon all regular sizes of shafting, from 5″ down to $2\frac{3}{8}$″ in diameter. This was accomplished by having a split ring, about 1″ wide, to fit in each end of the pulley, and bored to fit the size shaft upon which the pulley was to be placed. For driving drill presses, grindstones, boring bars for cylinders, or pillow blocks, I have never found anything so handy and so quickly applied as the pulley herein described.

Foreign Technical Notes.

Translated for the American Machinist.

NEW APPARATUS FOR THE ELECTRO MEASUREMENT OF THE HARDNESS OF STEEL.

According to the *Metallarbeiter*, Prof. Wattenhofen, of Prague, has produced a new apparatus for measuring the hardness of steel electro-magnetically. Its principle is, that hardness of steel may be very correctly inferred from a numerical determination of its coercive force. In its main features his new arrangement is shortly as follows:—From one end of a balance arm are suspended successively, in a brass holder, bars of the steel to be examined—those being as nearly as possible equal in weight. The other arm bends obliquely downward, and bears a constant weight. Motion of the beam causes a pointer to move radially over a scale, the movement being magnified by toothed wheels. One of the steel bars having been suspended, a magnetizing coil, equal to it in length, is raised on a stand so as to inclose the bar, and fixed with a binding screw when it does. Then a current is sent through the coil; then the coil is released and moved gradually down, pulling the bar with it, till the latter breaks away, and the deflection of the pointer is noted at which this occurs. This affords an accurate estimate of the hardness of the steel. For example, a bar *a*, gives a maximum attraction, 9.6; a second bar *b*, 15.5; a third *c*, 14.6. It is inferred that *a*, is considerably harder than *b* and *c* and of the two latter, *c* is harder than *b*. Every precaution is taken in the apparatus to prevent injury to the parts from the sudden recoil when the hold of the coil on the bar ceases.

IMPROVED VULCANIZED INDIA RUBBER.

M. Ziebarth, of Berlin, says the *Deutsche Metall- u. Industrie Zeitung*, has devised a process which resists the influence of fats or oils, while maintaining all its other ordinary characteristics. It consists in the addition of glycerine to the melted india rubber, before proceeding to vulcanize it. The india rubber is manipulated between warmed rollers, after the addition either of the glycerine alone, or of glycerine with the other mineral or metallic substances usually employed, such as sulphate of zinc, white lead, chalk, flowers of sulphur, etc. A capital material is obtained from a mixture of 3 kilogrammes of india rubber, 3 kilogrammes of chalk, 0.50 kilogrammes of glycerine (of sp. gr. 1.230), 0.10 kilogrammes of litharge, and 0.20 kilogrammes of flowers of sulphur. The objects made from this mass are vulcanized by laying them in a glycerine bath, and then exposing them to the influence of steam, in a closed vessel, under a pressure of two or more atmospheres, the length of exposure varying according to their size. For some of them the simple glycerine bath alone suffices The inventor has patented his process for the German empire, Austria, and France. Very satisfactory results have been obtained with the invention.

NEW PROCESS OF CONSTRUCTING BOILERS.

The *Berg. u. Hüttenmu Zeitschr.* says that a number of engineers and other scientific men visited lately the works of M. Haubold in Chemnitz, Saxony, to witness the new process of producing weldless and seamless steel or iron boilers, which has just been patented by that gentleman. The inventor claims that he can, within the brief space of six hours, construct the shell of a boiler of a more durable nature than those now used. It seems the process is very simple. A ring of steel is cast and white heated. It is then removed from the furnace by means of cranes, and placed upon a large roller, which is capable of performing 210 revolutions per minute, provided that sufficient steam is maintained. By the aid of this roller, and sets of smaller rollers, the ring is expanded to the required dimensions, and when removed is fit for use as the shell of a boiler. The ring, it must be understood, is run from one end of the roller to the other, and is returned by a revulsion of machinery, which is certainly one of the most important features of the invention. The other portions necessary to make a complete boiler are subsequently put on with L and V bolts. It is asserted by the inventor, who was present at and directed the trial, that by this process he can construct boilers which will stand twice as great a pressure to the square inch as welded and riveted plate boilers.

HOLLOW STEEL SHAFTING.

The *Moniteur Industrielle* says, that hollow steel shafting is now coming into extensive use. At the Creuzot works in France, this description is produced by casting the metal round a core of lime, the ingot being finally rolled into shafting, the lime core going with it and diminishing in diameter in the same proportion as the metal, even when the total diameter is reduced as low as $\frac{1}{4}$ in. Samples that have recently been shown on the Exchange amongst members of the iron trade, have created a considerable sensation.

MALLEABLE BRONZE.

According to the last number of *Comptes Rendus*, M. Dronier claims to have discovered a simple method of rendering bronze as malleable as copper, iron, etc. This consists in the addition of a very little mercury—$\frac{1}{2}$ to 2 per cent. It seems to act mechanically rather than chemically. The mercury may be combined with one of the metals of which bronze is made, before they are combined, by pouring it into the melted metal and stirring well, or it may be put into the melted copper along with tin, or just after the latter has been added, or an amalgam of tin is stirred into the melted copper.

Newly Incorporated Companies.

NEW YORK.

Rochester & Charlotte Railroad Company; Walston H. Brown, Henry K. Southwick, Frank G. Wentworth, Nelson Robinson, Fred. A. Brown, Herbert P. Brown, Russell F. Webb, Thos. F. Wentworth, Thos. B. Browning, Adrian Iselin, Jr., Wm. M. Shaffner, Christian Von Hesse and Frederick J. Stone, Directors; Capital, $90,000. To construct, maintain, and operate a railroad commencing at a point in the city of Rochester, and running thence by most feasible route to or near Charlotte in the town of Greece, at a point on or near the shore of Lake Ontario. Length of road about nine miles.

Eames Petroleum Iron Company, New York; Charles J. Eames, John S. Andrews, and John A. Balestier, incorporators; Capital, $1,000,000. For the production of iron, and the manufacture of iron and steel in all its branches.

East Side and Mount Vernon Railway Company; J. J. R. Croes, John M. Masterson, Joseph S. Wood, David Quackinbush, David Cromwell, James Russell, Phillip Lucas, Jr., James Henderson, Jr., and John Berry, Directors; Capital, $250,000. To construct, maintain, and operate a railroad, beginning at a point in the boundary line between the County of Westchester and City of New York, at or near Bronxville, thence to Jerome Post Office, to Wakefield, to Washingtonville, to Mount Vernon, and to the north line of the City of New York; also, branch from Mount Vernon to road leading from Sageman's Corners to Eastchester; also, branch from road leading to Sageman's Corners to Eastchester, to a point of connection with New York and New Haven R. R. Co., and Housatonic and Northern R. R. Co.

The Heaton Emery Works, Albany; Charles Heaton, Wm. B. Melick and Edward Wackerhagen, incorporators; Capital, $30,000. To manufacture and sell emery wheels.

The Standard Hod Elevating Company, New York; George W. Brown, Albert F. Hull and Walter N. Capen, incorporators; Capital $100,000. To manufacture, use, sell and rent hod elevating and hoisting machinery.

J. P. Cooke Manufacturing Company, Allen, N. Y.; J. P. Cooke, Alfred P. Wright, Wm. H. Baker and others, incorporators; Capital, $60,000. To manufacture and sell boots and shoes, leather and findings, and other articles properly belonging to the business.

The New Jersey and Hudson River Railroad Company; Chas. H. Martin, Fred. W. Kelsey, Jno. D. Haines, Chas. D. Haines, H. McGonegal, F. H. Skeele, W. E. McJilton, W. H. H. Jones, J. B. Fartoule, Chas. C. Lathrop, H. W. Leslie, N. J. Vanderweycle and Frederick Baker, incorporators; Capital, $600,000. To construct, maintain and operate a railroad, commencing at a point of connection with another railroad on the New Jersey State Line, west from Pine Island, Orange County, and extending to a point of connection at a bridge now in process of construction, to span the Hudson river near the village of Lloyd, in Ulster County. Length of road, about 41 miles.

Empire Electric Light Company, New York; Truxton Burrell, William H. Murkland, Samuel J. Burrell, A. S. Rollins, and Andrew Comstock, incorporators; Capital, $400,000. To manufacture, sell and furnish electric light apparatus, and to produce and distribute such light.

Phœnix Foundry and Machine Company, Syracuse; A. Cadwell Belden, Alvin J. Belden, Wm. K. Niver and others, incorporators; Capital, $60,000. For the manufacture of engines, boilers and machinery, and the general manufacturing business of a foundry and machine shop.

Whiting Stronghold Belt Clasp Company, New York; Henry Cummins, Samuel C. Gallaher, and Wm. M. Whiting, incorporators; Capital, $100,000. To manufacture and sell belt clasps, clasps or tips for ends of ropes and other purposes, and pincers for setting or fastening the same.

The Krom Ore Crushing and Concentrating Machine Company, New York; Robert F. Brooke, Arvid H. Elliott, Stephen R. Krom, Abram Longbottom, and E. B. Grant, incorporators; Capital, $250,000. To manufacture ore and stone breakers, crushing rollers, ore concentrators, and general machinery used for mining and milling purposes.

The New York, Chicago and St. Louis Railway Company; Columbus R. Cummings, Dan. P. Eells, Calvin S. Brice, Charles Foster, Samuel Thomas, Geo. I. Seney, Jno. T. Martin, Edward H. A. Lyman, Walston H. Brown, Wm. Fleming and Alexander M. White, Directors; Capital, $35,000 000. Consolidation of Buffalo, Cleveland and Chicago Railway of New York; Buffalo, Cleveland and Chicago Railway of Pennsylvania; New York and Chicago Railway of Ohio; New York and Chicago Railway of Indiana, and New York and Chicago Railway of Illinois.

Ship and Warehouse Fire Extinguisher Company, New York; A. Foster Higgins, Wm. Krebs, A. K. Johnston, Melville M. Johnston, and Thomas C. Doremus incorporators; Capital $300,000. To manufacture and sell fire-extinguishing apparatus.

Municipal Telegraph Construction Company (limited), New York; Willet C. Ward, Wm. S. Warner, James H. Wark, Chas. McNamee and Roger Foster; Capital, $5,000. To construct, equip and maintain a district telegraph and telephone company, and to manufacture and sell telegraph machinery and supplies generally.

East River Bridge and Coney Island Steam Transit Company, Brooklyn; Andrew R. Culver, Henry W. Sayer, Edwin C. Litchfield, Allan C. Washington, Chas. Garlichs, Edward W. McGinnis and Edward H. Litchfield, Directors. Capital, $1,000,000. To construct, maintain and operate an elevated railroad, beginning on and over Water street at Fulton street, in the City of Brooklyn, running thence to Washington St., to High St., to Pearl St., to Willoughby St. to Fleet Place and Fleet St., to Debevoise St. to corner of DeKalb and Hudson Avenues, to Flatbush Avenue, to Atlantic Avenue, to Fifth Avenue, to Second St.,to Seventh Avenue, to corner of Braxton Street, thence through private property and sundry Streets and Avenues to the city line near Gravesend Avenue, and the railroad of the Prospect Park and Coney Island Rail Road Company. Also Branch beginning at Fleet Place to Willoughby St., to Raymond St., to Park Avenue, and connect with Brooklyn Elevated Railway Company; also branch beginning at South Ferry, along Atlantic Avenue to Columbia St., to West Baltic St., to Court St., to Baltic St., to Fifth Avenue, and connect with main line.

NEW JERSEY.

The Browne's Evaporator, Gas and Steam Generator Co., Jersey City; Incorporators, J. J. Dunne, E. A. LeGrand, Wm. T. Browne and D.W. Cooke. Capital stock, $600,000. To manufacture and sell, by license, Evaporators and other machinery for making sugar, and other purposes, and Gas Generators for producing heating and illuminating gas.

The New York, Pittsburgh & Chicago Construction Company, Jersey City; H. R. Low, S. K. Schwenk, D E. Culver and others, incorporators. Capital stock, $2,000,000. To build, construct, equip and operate railroads, canals, bridges, &c.

The Perth Amboy Water Company, Perth Amboy; James M. Loweree, William King, Alfred Hall and others, incorporators. Capital stock, $100,000. To construct, maintain and operate Water-works in the City of Perth Amboy, N. J.

The American Dressing Tan Bark Company, Bloomfield; A. Gilbert Darwin, James L. Hill and James C. Beach, incorporators. Capital stock, $1,000,000. To purchase letters patent for the preparation of Tan Bark, and to manufacture and to license others to manufacture the same.

MASSACHUSETTS.

The Shorey Spring Bed and Shade Roller Co., Lowell; Abel Wheeler, Prest., Abel T. Atherton, Treas. Capital, $60,000. For the manufacture of spring beds and shade rollers.

The Nantasket Steamboat Co., Boston, R. M. Pulsifer, Prest., Alfred Schoff, Treas. Capital, $50,000. For the running of steamboats between Boston, Hull and Hingham and other ports on Massachusetts Bay.

Chelsea Beach Railroad Co., E. B. Phillips, J. C. Rogers, John Cummings, Richard Olney, G. S. Morison, Wm. B. Bacon, Geo. P. King, S. J. Young, A. P. Rockwell, Directors. Capital, $10,000. For the purpose of locating, constructing and operating a railroad commencing at Oak Island station of the Eastern R. R. in Revere, Mass., connecting with the Boston Revere Beach and Lynn R. R. at Ocean Ave., thence to the Ocean House in said Revere. Length of road, one mile. Gauge, 4 ft. 8½ in.

ILLINOIS.

The Swiney Furniture Company, Denis M. Swiney, Edward E. Swiney and Neils Fieldse, incorporators. Capital, $30,000. For the manufacture and sale of Furniture. Location, Chicago.

The Woolner Brothers Distilling Company, Morris H. Woolner, Ignatius Woolner and Samuel Woolner, incorporators. Capital, $200,000. For the manufacture and sale of Spirits from Grain. Location, Peoria.

Chicago Belt Transfer Company, George L. Dunlap, W. W. Hill, Charles C. Bonney, Charles L. Bonney, D. O. Strong and John L. Beveridge, incorporators. Capital, $1,000,000. To construct and operate a railroad from a point at or near South Chicago harbor around the city of Chicago in a westerly, northerly and easterly direction by the most advantageous route or routes, to a terminus in or near Lake View, north of the city of Chicago. Principal office, Chicago.

A consolidation has been effected by and between the Rensselaer and Chicago Railway, of Indiana, and the Chicago and New York Railway Company, forming the Chicago and New York Railway Company. Board of directors, Wm. C. Kibbe, R. S. Dwiggins, E. P. Cowles, John H. Gutchey and James E. Abbott; Capital, $1,500,000. To construct, complete and operate a continuous line of railway, from the city of Chicago to Rensselaer, Ind., over the lines designated in the articles or charters of the two parties hereto. Principal office, Chicago.

Consolidation has been effected by and between the Chicago and Milwaukee Railway Company, the Milwaukee and Madison Railway Co. and the Sheboygan and Western Railway Co., forming the Chicago, Milwaukee and Northwestern Railway Co. Board of Directors are Albert Keep, Marshall Kukman, Martin L. Sykes, Augt. Schell, Marion Hughitt, Joseph B. Redfield, William L. Scott, Charles C. Wheeler and James H. Howe. To consolidate present lines of road and also construct several projected branches. Capital stock to be the aggregate stock of the respective Companies, as permitted under the laws of the States where incorporated and consolidated. Principal office, Chicago.

PENNSYLVANIA.

The Pittsburgh and State Line Railroad Company; H. E. Collins, George J. Carter, George Falkner and others, incorporators; Capital, $1,500,000. For the construction of a rail-road 150 miles in length, from the city of Parker, in Armstrong County, to a point on the state line between Pennsylvania and New York, where Tuna Creek crosses the same. Principal office, Pittsburgh.

Manufacturing Notes.

Many Boiler makers are still on a strike for higher wages in Pittsburgh.

A nail factory will be erected at Wyandotte, Mich., as soon as the weather permits.

Iron moulders of Cleveland, O., have been on a strike for 15 per cent. advance of wages.

The project for erecting a sugar beet factory in Schenectady, N. Y., has fallen through.

Emil Kipper will erect a new woolen mill, for worsted goods, one mile north of Renfrew, Mass.

The new cotton mill at St. Stephen, Canada, will be owned, managed and operated by American workmen.

The Slater Cotton Company, of Pawtucket, R. I., will soon begin the erection of a new brick mill, four stories in height.

C. M. Giddings, formerly connected with the Waters Governor Co., Boston, has taken an interest in the Lansing Iron Works, Lansing, Mich.

Mr. Boyd, of Providence, R. I., is in Georgia, in behalf of several New England capitalists, and is prospecting for the best place in the State to erect a large cotton factory.

Congdon & Co., boot and shoe manufacturers, will move their business from Chicago to Elgin, Ill. The citizens of Elgin donate $2,500 for moving expenses. They will employ about 100 hands.

Haile, Frost & Co., woolen manufacturers, Hinsdale, N. H., are putting in a boiler 7 feet in diam., 16 feet long with 189 tubes 3 inch in diam. They will set this boiler with the Jarvis Patent Furnace.

The Betts Machine Co., Wilmington, Del., write us: Business still very good; we are much pushed with orders. Have just completed an addition to our foundry, which will increase our facilities considerably.

New cotton factories are the order of the day in the Dominion. A report from St. John, N. B., says: The proprietor of the New Brunswick Cotton Mill contemplates the erection of another mill "at or near the Intercolonial Railway," and asks Portland Town Council for exemption from taxes for ten years,—Sussex having offered a site free of charge, and Moncton being ready to exempt the mill from taxation and also take stock.—*Boston Commercial Bulletin.*

Toledo, O., has a prospect of having iron and steel works, spice mills, manufactories of butter tubs, boat oars, lamps, turbine water wheels and portable saw mills, and a wood pulp paper manufactory.

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☞ *We invite correspondence from practical machinists, engineers inventors, draughtsmen, and all those specially interested in the occupations we represent, on subjects pertaining to machinery.*

☞ *Subscribers can have the mailing address of their paper changed as often as they desire. Send both old and new addresses. Those who fail to receive their papers promptly will please notify us at once.*

NEW YORK, MAY 14, 1881.

CONTENTS.

PAGE.

Machine for Testing Materials 1
Where and How to Build Machine Shops. By A. H. Emery, C. E 1
Johnson's Balanced Slide Valve 2
Seeking Light on the Shafting Question. By F. F. Hemenway 2
Tool for Cutting Washers 3
Improved Shaft and Pipe Couplings 3
Letters from Practical Men—Mechanical Drawings—A Tool Holder—Device for Turning Gas Pipes—Drawings that Won't Stay in Good Order—Moulding Pulleys—Method of Copying Drawings—The Classification of the Subject Matter of Mechanical Books—Calculating Laps and Port Openings—Instruction in Drawing Wanted—Drawing Square, Hexagon and Octagon Bolt Heads—New Way to Find Area of a Diagram—Age of a Valuable Style of Piston Rod-Packing—Counter-balancing Engine—Chordal's Bolt Drawing—Another Method for Drawing—Can Our Mechanics Use the Metric System—Bureau of Labor Statistics—Some Consideration in Making Drawings 4, 5, 6
Adjustable Core Box. John W. Nystrom 6
Shop Kinks No. 10. L. F. Lyne 6
Foreign Technical Notes 7
Newly Incorporated Companies 7
A Branch of Modern Mechanics 8
Spring Meeting of the Mechanical Engineers 8
Wiping Locomotives 8
How to Obtain More Wages 8
Two Suggestive Strikes 9
Literary Notes 9
Questions and Answers 9
Manufactures 9
Machinists' and Engineers' Supplies 10
Iron and Metal Review 10

A Branch of Modern Mechanics.

Various departments have long existed belonging to both pure and applied mechanics, but there is one branch or department of mechanics which has remained undiscovered, or, at least, never brought prominently before the American public as an essential adjunct to the highest development of mechanical science, until within the past few years. That branch is familiarly known as "stock jobbing," and it plays a very important part—in fact, *the* important part—of some very noted mechanical ventures, from which the public are now anxiously expecting practical developments. If there is necessarily any subtile connection between the invention and application of new mechanical principles and the manipulation of "points" upon the stock market, it has remained for modern philosophers to discover that connection, and make it contribute to their material acquisitions. We find no mention in ancient history of a stock syndicate for the purpose of pushing the financial interests of prominent inventors. It probably never occurred to Archimedes to organize the National Lever and Hoisting Co., or the Central Screw Pump Co., at Syracuse, and tributary companies in all the other flourishing towns of Sicily, to dispose of valuable proprietary interests in his inventions. Even had he done so, the chances are that the stock would not have sold very freely, as daily newspapers were lacking at Syracuse, and there were no enterprising reporters to write up his wonderful exhibitions of moving heavy buildings, and raising torrents of water to the hanging gardens with his patent screw pumps. He and his coadjutors would therefore have been obliged to buttonhole men of means, who could have found no time to attend those exhibitions, singly or in small groups, and pour into their ears the prospectus of the new companies, detailing the great expectations they were building upon, and the bountiful returns awaiting investors.

So far as history records the character and habits of the ancients, we are led to infer that no astonishing mechanical inventions would have had much influence upon their stock markets, until unrestricted opportunity had been afforded disinterested mechanical engineers, like Hero and Archimedes, to investigate and report upon the actual cost of working them and the real value of the results produced. But modern progress is so rapid and so radical, that such little preliminaries are passed over until some future convenient season. Every investor in a great mechanical scheme is anxious to increase the market value of his stock, and naturally takes pains to induce others to join, and to keep up the public astonishment in regard to the exhibitions of the great invention. A judicious amount of stock is therefore placed where it will do the most good.

It often happens with some of these startling mechanical ventures, that the original company is enabled to pay large dividends before the invention is put to any extended use, or even to enough practical use to definitely determine its merits. This is accomplished by selling geographically limited rights to use the inventions, upon which local companies can be formed and new stock issued. The payment of big dividends by the original company in such cases, is calculated to excite the interest of capitalists in the stock of local companies. There are other plans, but we forbear outlining them. In view of current achievments in marketing mechanical stocks, we suggest that the next mechanical cyclopedia that shall be published ought to contain an elaborate article on mechanical "stock jobbing."

Spring Meeting of the Mechanical Engineers.

This issue of the AMERICAN MACHINIST will reach a large portion of our readers on the opening day appointed for the first regular meeting for this year of the American Society of Mechanical Engineers, to be held at Hartford, Conn., Wednesday, May 4th. The secretary, Thos. W. Rae, 239 Broadway, New York, has issued a circular, announcing the programme to be followed on that occasion, from which we take the following:

The Mayor of Hartford has, with thoughtful courtesy, accorded the society an audience room in the City Hall.

The headquarters and reception rooms are at the United States Hotel.

Wednesday, May 4th.—Opening session. Common Council Chamber, City Hall, 8 P. M.

Members who arrive sufficiently early on Wednesday, will find at headquarters a list of places of professional interest, which may be visited that afternoon.

Thursday, May 5th.—Morning session, Common Council Chamber, City Hall, 10 A. M. Afternoon session, Common Council Chamber, City Hall, 2.30 P. M. Subscription dinner, Merrill's restaurant, 8 Central Row, 7 P. M.

Friday, May 6th.—This day will be chiefly devoted to visiting, by invitation, places of professional interest in Hartford. The society will assemble at headquarters at 8.30 A. M., and at 3 30 P. M., where carriages and escort will be in attendance.

Closing session, Common Council Chamber, City Hall, 7.30 P. M.

It is very desirable that members, purposing to attend the subscription dinner, should give their names to the secretary at the Opening Session, so that ample preparation may be made. The price of tickets is $7.

Preparations are made for the reception of ladies at the sessions, and at the subscription dinner.

Convenient trains leave the Grand Central Depot, New York, for Hartford, at 8.05 and 11 A. M., and 1 and 4 P. M., arriving at 11.50 A. M., and 2.24, 4.45, and 7.08 P. M., respectively.

Wiping Locomotives.

We remember reading some time since of a manager of a prominent railroad who had abolished the custom of wiping the locomotives upon the road where he was manager. We had occasion not long since to examine some of the locomotives upon a road which followed the example set by the manager alluded to, and found to our astonishment that it was utterly impossible to tell whether there were one or two nuts or no nuts at all upon some of the pedestal bolts. We also noticed that several nuts were gone altogether, the bolts having been broken off even with the frame so that the excess of dirt concealed the broken bolt. There was about $\frac{3}{8}$" play between the eccentrics and the straps, besides plenty of lost motion in the pins about the links. We inquired for the engineer, and found him to be one of the most disconsolate men we ever saw. When asked why he did not shine up his engine as used to be the custom, and take the accustomed pride in his engine, he replied as follows: "We used to have a manager who took great pride in having the engines and rolling stock look well, and we engineers then used to spend many an extra hour in working about our engines and in making a thorough inspection. But since we have had a change in the management of affairs the engines are not wiped, consequently we do not get under the engine once a month, and never touch anything below the cylinders unless we are absolutely compelled to do so, and then we get nearly smothered with oil and dirt."

"I used to take great pride in having a smart engine and in keeping her nice, but now I don't care. I've lost my ambition; I am in as high a position as I will ever hold on this road. All the boys are the same way. As soon as an engine comes in a fresh man is put on and out she goes again."

The foregoing is in brief a fair example of the locomotive engineers upon several railroads who have not wiped their locomotives during the past two or three years.

It would seem, that if there was so much economy in saving the wages of a few wipers, and the expense of waste, that those roads would declare large yearly dividends; but if we can judge from the actual condition of the roads (one of which being now in the hands of a receiver), we would say that the economy was in reality extravagance. The road, now in a receiver's hands, was the first to abolish wiping engines. This had the effect of demoralizing the engineers and firemen, thereby causing accidents, and finally, the utter failure of the company. It is often remarked by engineers that this road runs the poorest and dirtiest locomotives in the country.

How to Obtain More Wages.

With increasing business in almost every line of productive industry comes increasing difficulties with labor and wages. Strikes and lock-outs are becoming almost everyday occurrences. These result, with very few exceptions, from efforts to regulate and equalize wages on the wholesale plan, without taking into account, or in any way recognizing, the more rapid progress (and consequent greater value to an employer) of some workmen than the great body of their associates. Outside of the mechanic arts the equalizing principle may work with full satisfaction, as, for instance, with street-car drivers and conductors, or wherever great corporations (who are supposed to have no souls) hire masses of men, and keep them upon some steady and unvarying work, like so many horses, without the least regard to different individual abilities or ambitions.

One coal miner may prove more valuable than another, but, if working by the day, under the system commonly practiced in large collieries, he will find it difficult to make that fact contribute to his material advancement. But, with artisans in the average shop, conducted by the average proprietor, there is, or ought to be, a stimulus for every sober, energetic man to acquire skill and dexterity as rapidly as he can, and to make himself worth more, and to obtain more wages than others who will not so exert themselves. The machinist, moulder, boiler maker, pattern maker or blacksmith, who has no greater ambition to advance himself than to get an advance of wages when the whole shop is advanced, on the basis of a uniform per cent. of the wages already received, will never rise to the top of his business. If he is content to drift with the tide, he must not expect to float away from the most storm-tossed driftwood. In the shop every workman's ability and energy must show itself. Many of them seem to have no greater aspiration than to be pushed along with the general crowd. They are afraid to trust their own inherent capabilities, and to strike out upon an independent course for bettering each his own condition, but lean upon the shoulders of their fellows, and endeavor to gain advancement by joining in a general outcry for a recognition of their rights as a crowd of workmen. These are the artisans who, after working at their trade twenty years, usually have nothing more to show as the result of their labor than they had to start with.

Again, there is quite another class of mechanics to whom we wish to direct attention. In every shop may be found men who are always on the alert to gather new practical ideas and to work out improvements for themselves. They study to gain advancement both in and out of the shop, and although they are ever ready to afford needed assistance to their fellow workmen, they strive to occupy higher positions by fitting themselves individually for these positions, and consequently for higher wages. When they exhibit the necessary proficiency they step into better situations as a natural consequence, because the situations are waiting for mechanics capable of filling them. Of the latter class are the men who will be the shop superintendents and shop proprietors of the future, just as most of the present superintendents and proprietors in this country have worked their way upward while belonging to this class.

When a mechanic has good reasons for thinking he ought to have more wages, the best way is to go straight to his employer and say so. If he goes in the proper spirit he will not lose anything by so doing, whether he gets the advance or not; but if he tries to organize all the men in the shop on a war footing he may come out of the campaign much worse off than when he started it.

On the other hand, shop proprietors should, without exception, take pains to inform themselves as to the expectations and desires of their employes. By so doing they will, at times, prevent some unpleasant surprises.

On our first page, this week, may be found a well-fitting article upon the question of, "Where and How to Build Machine Shops," by A. H. Emery, C. E., who designed and built the great testing machine for iron, steel and other materials, for the U. S. Government. That machine is now in use in the U. S. Arsenal, at Watertown, Mass., and excites the wonder and admiration of engineers from all parts of the world, who have witnessed its operation.

Two Suggestive Strikes.

At a mass meeting of horseshoers, held recently in this city, a strike was proposed upon a principle which of late has found few advocates. The first resolution which was passed requested all journeymen employed in this trade to immediately enroll themselves in a union for the purpose of striking against machine-made horse shoes—(presumably not with hammers); while the second resolution pledged the union against any strike for an increase of wages until machine-made shoes are driven out of the city; and the third conclusion reached embodied the claim that the men who make the shoes should put them on.

Now, since the day when Mrs. Partington swept back the ocean with a broom, or since that other historic encounter between the bull and the locomotive, there has not occurred anything more absurd than this. In the early days when machinery began to "supersede" hand labor, as it was called, numerous instances occurred in which workmen attempted to resist the introduction of machinery, but always with this result, that resistance proved futile, while in some unaccountable way it would transpire that more work was done, and more workers found employment and more comfortably than ever before. When railroads were first proposed, they were resisted because it was thought they would make property in horseflesh worthless, but somehow the more railroads were built, the more horses were required for the variously increased uses which precede and follow the introduction of railroads. In the present instance, the fight of the horse shoers against the introduction of machine shoes will probably serve to advertise the merits of machine-made shoes, and by making horse flesh appear to be a less expensive luxury, tend to induce a great many people to own a horse, who never did before. Whether the machine-made shoes can also be made to employ labor profitably, as a feature of export trade to countries where horses now go barefoot, is a question that only time will tell. But it is safe to assume, that the misguided workmen, who can find nothing better to do than to make a fight against the Nineteenth Century, and the sub-division of labor which makes one man a maker of horse shoes, and another a shoer of horses, will gain experience as they go on that will be valuable.

A strike of a very different nature has recently been inaugurated by a benevolent carbuilding company in Pennsylvania. It seems that, becoming satisfied that serious evils were being caused to their work and workmen by the prevalence of drinking habits in their town, the company philanthropically paid the three hotel keepers of the village a bonus of about six thousand dollars, as a consideration for the profits they would forego by abstaining from liquor selling for one year, and induced them to make such an agreement. Unfortunately, however, across the river, only a quarter of a mile away, and readily reached by a bridge, is an unregenerate town, where the liquor dealer lives in clover, and whiskey is only five cents a glass! Naturally a good many thirsty workmen are disposed to seek consolation across the bridge, and the benevolent employers in question have recently been forced to announce a rule that any employe who crosses the bridge for this purpose will be promptly discharged. Ordinarily, when a man goes out to drink, he describes himself as going out to see a man, but just what excuse the thirsty souls who hereafter cross this particular bridge will offer can only be divined. Possibly the company may find themselves obliged to import a number of detectives from the nearest city, unless a permit can be obtained allowing them to burn the bridge!

Seriously, such well-meant attempts to govern or coerce grown-up workmen, by mapping out rigidly, in advance, just the things they may and may not do, are not at all in the line of progress. Workmen are men and should be treated as such. The workman who is found to love his whiskey better than his work, is not a profitable man to employ, and no employer can be blamed for refusing to employ him. The workman who is put squarely upon his own responsibility in personal matters must be made of very poor stuff, indeed, if he does not grow into a better man by so doing. Sympathetic help is one thing; sentimental coddling is quite another.

Our "Letters from 'Practical Men" this week treat upon a variety of subjects, but the mechanical drawing question remains uppermost. Chordal's recent review of the different methods of drawing a bolt seems to have had no small impression upon the draughting fraternity. An apprentice who wishes to learn drawing relates his difficulty in finding an instructor. In many cities there are evening schools for teaching mechanical drawing, but where these are not accessible and no good instruction is available, let the learner get a book on mechanical drawing, a set of simple instruments and study it without an assistant. Some very excellent draughtsmen have learned the art in that way. Tool posts, turning tools and pulley moulding come in for some consideration, while Mr. Rose points out the unsystematic system upon which cyclopedias and dictionaries of mechanics are usually written or compiled. If an apprentice wishes to learn anything clearly from such works, he may find it necessary to begin at A, and study the whole of it through to Z; then start backwards, and study through to A again. It is evident that a better and more acceptable arrangement of contents could be made.

Literary Notes.

The Leffel Mechanical News, Springfield, O., has been enlarged to twenty pages, and is now issued twice a month, at the very low price of $1.00 a year, or five cents a copy. It is very neatly printed and illustrated, and contains a variety of interesting matter.

The Boston Journal of Commerce comes out enlarged to eight broad pages, increasing its reading matter 40 per cent. It adopts, at the same time, an entire new dress of type (a spring suit) right from the foundry, and presents a very cheerful and smiling appearance. The subscription price remains at $3.00 a year. Its editor, Thos. Pray, Jr., prosecutes his work with indefatigable energy, and presents evidences of success.

QUESTIONS & ANSWERS.

Under this head we propose to answer questions sent us, pertaining to our specialty, correctly, and according to common sense methods.

(1) J. A. G., Stillwater, Minn., asks: Please tell me what is the best thing in the shape of a speed indicator, for measuring the revolutions of steam engines and general machines? *A.*—The most successful counter that we have ever seen or used, was described in our issue of August 7, 1880, and will count accurately up to a speed of 1,000 revolutions per minute, if necessary.

(2) E. G., St. Catherines, Ont., asks: Will you please inform me how to construct a good fan for taking away the dust from three sand belts used for polishing spokes; or is there any better way than the application of a fan for that purpose? If you recommend a fan, please state at how many revolutions it ought to run? *A.*—We recommend that you purchase a fan blower, to be had of any dealer in engineer's supplies, as it will be much cheaper than to attempt to make one. The smallest size made will answer your purpose very well.

(3) W. T. N., Pittsfield, Mass., asks: Will you please inform me who I can write to, or go and see, about getting a chance to learn how to run a marine engine? I would like to go on the N. Y. and Fall River Line of steamboats. *A.*—We are continually receiving letters, similar to the above, from persons whom we have neither seen nor know by reputation. We would be pleased to get you a situation, if in our power, but naturally would find it difficult to go out and hunt up a job for an entire stranger. We recommend as the wisest course, that you procure recommendations from persons who know you, and apply, in person, for a situation at the office of the company referred to in this city.

(4.) G. E. S., East Stroudsburg, Pa., writes: I would like to have your opinion as to the best plan of balancing pulleys, cylinders, etc., so as to have them not only in standing but running balance, the longer the cylinder the more difficult the task seems to be. A little light on the subject will be of great value to the manufacturing community. It matters not how well a machine is built in its several parts unless they are well and properly balanced. *A.*—The only way to make a perfectly balanced pulley, so that it will not only balance at rest but also running at all speeds, is to have all parts of the rim and arms of equal weight. A pulley may be balanced at rest, but may not be so when running. A new pulley has recently been placed upon the market which has a wrought iron rim of a uniform weight and thickness. The hub and arms are first cast, bored and ground to a true bearing. The rim is then put on and is also ground inside and out; thus making a perfectly balanced pulley. See answer to question 5 in our April 9th issue.

(5) H. G. M., Lynn, Mass., writes:—I notice in your issue of March 19, 1881, an article on the proper shape of planer tools, by Joshua Rose. The article reads as though Fig. 1, was the best shape for the tool. Does not the writer refer to the wrong figures? *A.*—Fig. 1 and Fig. 2, should be transposed to read correctly. Fig. 5 should read shaft coupling, the true illustration for Fig. 5 being omitted. This was corrected in a subsequent issue.

(6) W. M. W., New York City, asks: Will you please inform me what the average pay of locomotive firemen is per month? Also, how does a person who desires to be a locomotive fireman get to learn those duties? *A.*—A locomotive fireman gets from $40 to $55 per month, according to circumstances. It is customary for a man who wishes to become a locomotive fireman to enter the round house as wiper or begin firing upon a switch engine. From thence he is sent out upon a freight engine, after which he is promoted to fireman upon a passenger engine. After proving himself worthy he is placed in charge of a freight engine as engineer, and is finally given a passenger engine to run. The foregoing is the course through which most men must pass, unless aided by friends in influential positions.

(7) J. A. W., Plainfield, N. J., asks: Can you inform me what is the usual time apprentices serve in carpenter or machine shops, and what is meant by the term "shop priviliges," and does extra time lessen the term of apprenticeship? I wish to learn a trade and would like your advice. *A.*—Three years is considered the customary term of apprenticeship. Shop privileges are understood to mean those liberties which of right belong to the workmen and which are allowed in every well regulated shop. In a shop where there is no system, it would be very difficult to define the above term. The making of overtime by the apprentice does not shorten the term of apprenticeship neither does the loss of time lengthen it.

BUSINESS SPECIALS.

50 cts. a line for each insertion under this head.

Special Notice.—Owners and managers of large establishments throughout the country will find information of positive value in our 75 page illustrated pamphlet, entitled "Useful Information for Steam Users." It contains data on the care and management of Steam Engines and Boilers and Rules for Engineers and Firemen. Sent for 25c. in P. O. Stamps. The J. N. Mills Publishing Co., 165 Broadway, New York City.

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James W. See, Designing and Consulting Engineer, Hamilton, Ohio.

J. C. Hoadley, Engineer and Expert, formerly of Lawrence, Mass., has opened an office at 29 High St., cor. Federal, Boston, Mass., where he will be pleased to receive old and new friends.

Steam Engines Indicated and Examined. Power Measured. W. H. Odell, P. O. Box 274, Yonkers, N.Y.

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Wanted to arrange with responsible parties for the manufacture of a New Air Compressor. The best yet designed. John Fish, 8 Pine Street, New York.

MANUFACTURES.

A four-set woolen mill is to be built immediately at Sagerville, Me.

The Hartford Carpet Company contemplate erecting a new factory at Thompsonville, Conn.

J. A. Fay & Co., Cincinnati, have increased their capital stock to $500,000.

The Hocking Valley Pipe Company propose to erect extensive works at Columbus, O.

The Westbrook (Me.) Manufacturing Company will build a new mill this season.

Red Wing, Minn., is to have a threshing machine factory very soon.

The Webb Tool Co. has started the manufacture of a patent twist drill in Pittsburgh, Pa.

Geo. W. Fifield is about to build a three-story addition to his engine lathe manufactory at Lowell, Mass.

McWilliams Manufacturing Company, Providence, R. I., are building an addition to their shops, 70x40 feet. They make jewelers' machinery.

The Spawn & Dennison Mfg. Co., of Philadelphia, will erect a new factory in the Sixth Ward in that city.

The Kearsage Mills of Portsmouth, N. H., will be rebuilt on an enlarged scale this year, and will have a capacity of 40,000 spindles.

The Peck, Stow & Wilcox Company are adding to their works in East Berlin, Conn., an office and additions to two of the shops.

The New Haven Clock Company will enlarge its works. In March, 60,000 clocks were made at that establishment.

The managers of the Coe Brass Manufacturing Company, of Wolcottville, Conn., are expecting a large order from Russia, which will take from two to five years to fill with night and day work.

The capital stock of a new cotton mill, to be established in New Orleans, $300,000 in amount, has all been subscribed. The mill is to be one of the largest in the South.

The Mohawk Valley Cotton Mills, at Utica, N. Y., are under contract for completion before Dec. 1st, 1881. They will be partially furnished with English machinery.

James Mahony has just put some of his patent furnaces under the boilers of the Insane Asylum, Middletown, N. Y. He has also applied his furnace to twelve boilers at Troy Mills, Fall River, Mass.

Nelson W. Twiss, of New Haven, Conn., has consolidated his engine business with F. C. and A. E. Rowland of that city. The new firm will build the Twiss engine. One of those engines will drive the machinery of the American Institute Fair next fall.

Our description of Watts, Campbell & Co.'s Corliss Engine, last week, was incorrect in stating the number of sets of patterns now made, patterns for twenty sizes, instead of six, being now in use, while the sizes built vary from 30 to 2000 H. P.

The following parties are having their boilers set with the Universal Improved Patent Furnace: T. Beck & Co., 7th Avenue and 29th Street, New York; New York Insane Asylum, Middletown, New York. These patent furnaces are supplied by J. Mahony and A. Aller, 109 Liberty Street, N. Y.

G. & H. Barnett, proprietors of the Black Diamond File Works, Nos. 33 to 42 Richmond St., Philadelphia, are building an additional file factory, which will increase the working capacity one-half, and give employment to 50 additional hands. The improvement will consist of a building 30 feet wide by 113 feet 10 inches in length, and two stories high.

Grainger & Co., of the Phœnix Foundry and Machine Shop, Louisville, Ky., have contracted for an addition of forty feet to the three-story machine department, besides extra lathes and other tools. Their principal business is the making of castings, steam engines and machinery in general for distilleries, tanneries, grist mills, &c.

The Tanite Company, of Stroudsburg, Pa., compelled by the increasing demand for their emery wheels and grinding machinery, are about enlarging their works. Plans and specifications are perfected for a building 24 ft. by 64 ft., four stories high. In consequence of the lateness of the season, however, it is impossible to get out the desired lumber in time. The original plans are therefore modified temporarily, and a building of two stories 24x32, will be erected, which at a late period will be enlarged to the original design.

The Elgin (Ill.) Watch Co. are largely increasing their capacity; have already built a machine shop 100 feet long, which they put up with the work benches, piped it for heating by steam, two lines of shafting the whole length of the shop, everything complete in three weeks from the time they broke ground for the underpinning. The machinery (from Pratt & Whitney, Brown & Sharpe, and Fitchburg Machine Co.) is now being put in place. They are now putting up an addition to the watch department, 220 feet long, which, when completed, will increase their capacity, which now is over 500 watches per day, to over 1,000 a day. The number of hands employed now is about 1,200; when the enlargement is completed they will employ over 2,500 hands.

Machinists' and Engineers' Supplies.

New York, April 28, 1881.

Trade is lively and supply merchants are light spirited. The machine screw manufacturers have issued their new price list which will be mailed upon application to any of them. The result is an advance of about 15 per cent. on iron screws and an average decline of 17½ per cent. on brass screws. Wood screws have also undergone a change in list prices, some sizes advancing and others declining. The firm of H. S. Manning & Co., 111 Liberty St., New York, will make some changes on the 1st. instant, notice of which will be made upon that date. There will also be some changes in the Ashcroft Mfg. Co., of Boston, at the same time, Mr. Chas. A. Moore withdrawing to join the present house of H. S. Manning & Co. We hear of other changes about to be made which will be given to the public after May 1.

The Norwalk Iron Works Co., South Norwalk, Conn., have just issued an illustrated catalogue of their steam pumps. They have adopted a system of telegraphic cipher to be used in ordering parts of pumps which we will refer to more fully hereafter.

Iron and Metal Review.

New York, April 28.

Business in Pig iron both in domestic brands and Scotch is restricted to small lots. Prices are not strong. Quotations, No. 1, $24 to $25; No. 2, $22; Grey Forge, $20; Coltness, $23.50 to $24; Eglinton, $21.50 to $22; Glengarnock and Gartscherrie, $22.50 to $23. Rails are unchanged. Wrought scrap is in diminutive demand at $30 for No. 1 from yard. Boiler Makers supplies are in fair demand for immediate use. Logically prices should have advanced by this time and every one is surprised that they have not. Large production of backwardness of season have kept market low. The outlook however is good. We quote:

Tank, 2¾c. to 2⅞c.; Refined, 3c. to 3⅛c.; Shell, 3⅛c. to 3¼c.; Flange, 4⅛ to 4¼c.; Extra Flange, 5⅛c. Bar Iron from store remains on a basis of 2.5c. for Refined.

The metal market is not over active. Ingot copper sells at 18¾c. to 19c. for lake. The English market is reported lower by cable. Tin is firm at 20¼c. for Straits and 20¼c. to 20⅜c. for Refined English. Refined Lead is held at 4¾c. to 4⅞c. and Common at 4⅛c. to 4⅝c. Domestic Spelter is dull at 4¾c. to 5c. and Silesian, 5¾c.; Sheet Zinc sells at 7c.; Antimony is steady at 14⅛c. to 15c.

WANTED

Wanted.—Foreman for machine shop doing a general business. He must be an energetic and thorough mechanic. Eagle Iron Works, Des Moines, Iowa.

Wanted—Machinists—A few strictly first-class vise and floor hands, capable of fitting up the heavier class of machine tools, such as Boring Mills, Planers, Axle Lathes, Driving Wheel Lathes, Car Wheel Borers, Engine Lathes, &c. Only thoroughly competent and experienced men need apply, we want no other kind. To such we will give *steady employment at the highest wages.* Hamilton is a suburb of Cincinnati, connected by telephone and 30 daily trains, living cheap, location healthy, and a particularly desirable place of residence for married men. Applicants will please state how long they have had experience building machine tools and in what establishments, and what wages are expected. Address or apply to Niles Tool Works, Hamilton, Ohio.

Wanted—Two or three good mechanical draughtsmen on light machinery and general tools. Address, Brown and Sharpe M'f'g. Co., Providence, R. I.

Wanted—A party with suitable facilities to contract for building fine light machinery in quantity. Address, "Artisan," care of carrier 42, Brooklyn P. O., N. Y.

To Tool Manufacturers.

I will dispose of the patent (which has recently been allowed me) at a low figure, for the most useful and indispensable tool for cutting washers of all kinds yet invented. Can be put upon the market and retailed at a low figure, yet leave large profits to the manufacturer. For particulars, address,

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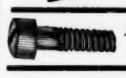

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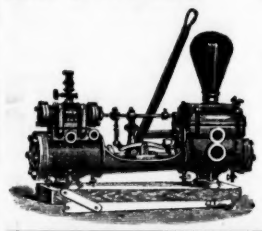

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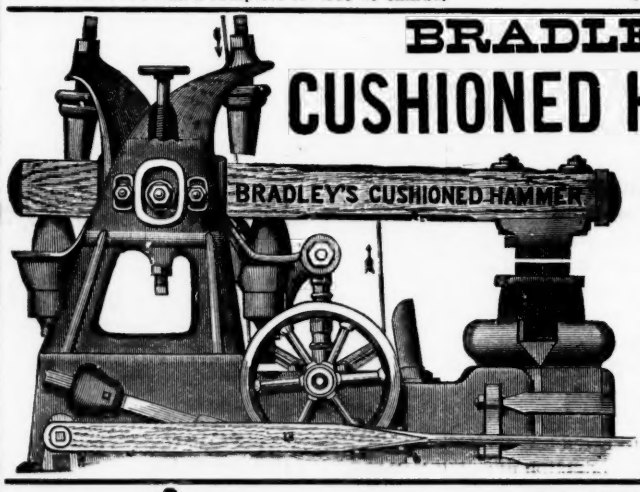

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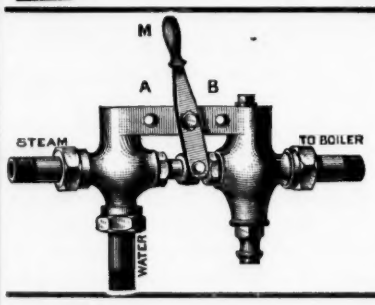

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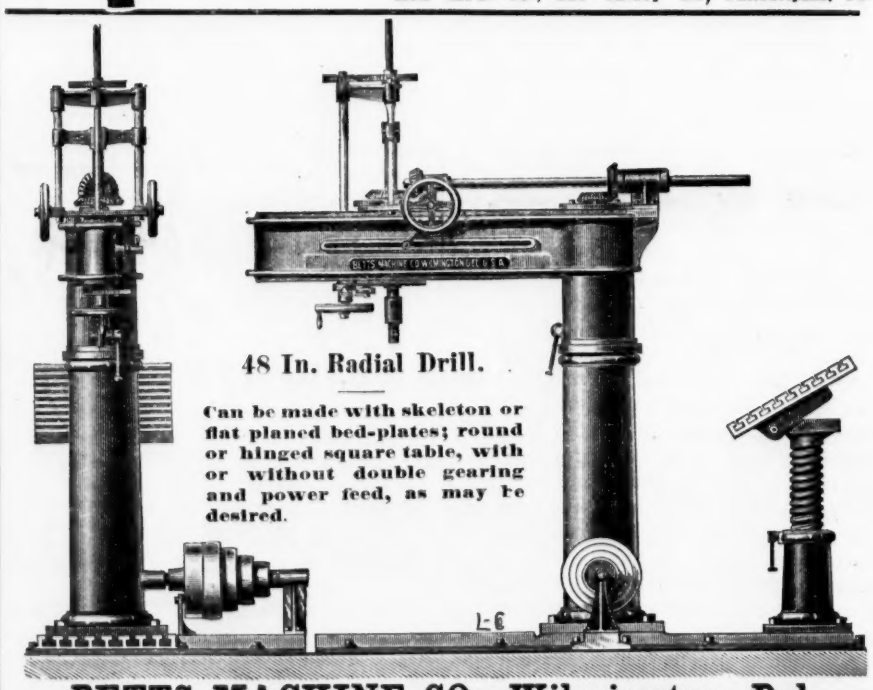

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